SPACECRAFT It's a lot harder to tell where your at though because your so much closer.

CAPCOM Okay, should be passing the East Coast right now.

SPACECRAFT Yes, we just passed the Coast. Which is totally cloudy.

CAPCOM Roger.

SPACECRAFT It looks like, George, bythe shadow on the bulkhead were just a little bit off of nose to sun. It looks like we got a yaw right at a degree or two or maybe more.

CAPCOM Roger Jack it looks good to us right now, I'd say we just as soon have you stay where you are and there's no problem.

SPACECRAFT Okay, on the left, just in fron of the left OMS pad, three of four of the bulkhead latches are in the sunlight. And so is the B TV camera

CAPCOM Okay, we copy that and we show in attitude within one degree.

CAPCOM Columbia, Houston were one minute to LOS, Dakar is next in five minutes, over.

SPACECRAFT Okay, we'll see you at Dakar and set up for TACAN over Africa.

CAPCOM Roger that Jack.

PAO This is Shuttle Control, Bermuda has loss of signal, Columbia's next station is Dakar in about four minutes. During this pass over the United States TACAN testing continued, Jack Lousma reported that he had completed sample three of the electrophoresis test earlier and that Gordon Fullerton was starting work on sample number four. Reported that experiment working well. And also reported that they haven't seen the hitchiking fruit fly for some time, they don't know where it's gone, perhaps among the mung beans which is another experiment. He again reported that he could see a lot of detail on the ground from Columbia's altitude of about 130 nautical miles, that he could see minor roads and buildings, but he thought it was harder to tell where Columbia was, over what position Columbia was than it was in Skylab because of the altitude, he's much closer to the Earth than he was in Skylab which was at an altitude of about 250 nautical miles. The EECOM Charles Dumis has reported to Flight Director Neil Hutchinson that the aft part of Columbia temperatures are down 10 degrees in the five hours in the five hours that the Spacecraft has been nose to sun. This is a slower

thermal response than had been expected. The mission elapsed time is two days three hours. And we're a minute and a half away from acquisition through Dakar, we'll stand by.

CAPCOM Columbia, Houston through Dakar and Ascension for nine and a half minutes, over.

SPACECRAFT Okey doke, just started checking on sample 4 here.

CAPCOM Roger, sample 4.

SPACECRAFT I was taking his picture working, I better get my TACAN set up.

CAPCOM Roger.

SPACECRAFT Okay in the TACAN world I got 108X, 92X, and 78X, lower, upper, lower, set in.

CAPCOM Roger Jack, we copy that and we're looking at it.

CAPCOM Columbia, Houston, Jack those TACANs look good to us.

SPACECRAFT Good.

END OF TAPE

PAO ...in an attempt to get the condensation off the aft windows CAPCOM George Nelson told Jack Lousma that he might be able to rig up a chute to direct air from a vent to the window and remove that condensation that was tried in the simulator and appeared to work alright using the plastic back of the world atlas that's aboard Columbia. We're about 30 seconds away from acquisition at Buckhorn we'll standby for conversation over the United States on this orbit. Mission Elapsed time is 2 days 2 hours 38 minutes.

CAPCOM Columbia, Houston back with you over the states.

SPACECRAFT Okay how do you hear me George.

CAPCOM Your loud and clear Jack.

SPACECRAFT Okay. I think I got the TACAN set up for USA. 111 160, and 100 lower upper lower is that the one wanted right now.

CAPCOM Roger Jack. That looks good to us.

SPACECRAFT And still setting them up 15 minutes late is that the way you want to keep working.

CAPCOM That's affirmative.

SPACECRAFT And how's our attitude hanging in there is it doing okay for you guys.

CAPCOM Standby a second Jack, we'll get that. Roger Jack your attitude looks good to us.

SPACECRAFT Okay George, one thing we're not getting done very well is the 16 mm stuff and any the TV or VIM cabin operations. We haven't (garble) quite that much yet but maybe you can stack them up the last three days.

CAPCOM Copy we understand. That's no problem.

SPACECRAFT And just for information, I started that sample three on the EEVT fairly early this morning and it's over with and Gordo's going to start on number four now.

CAPCOM Roger that's good.

SPACECRAFT And the electrophoresis seems to be working very well. The temperatures and the all the readings are right where they ought to be as expected in the book.

CAPCOM Okay Jack. I, we copy that. And for your information on the payload status that Dave read up this morning we left a PGU off of there and PGU and Carol Peterson wanted you

to know that they really appreciate that TLC you've been giving their plants and they wanted you to make sure to keep the fruit fly away from the mung beans.

SPACECRAFT I haven't seen him I think he finally found a place because he was getting pretty good at flying around here. That's probably where he is. So far those plants growing haven't pushed the lockers up or anything like that they are still well controlled I think.

CAPCOM Roger that. And another just note of information we did lose the H2 Tank 2 quantity transducer. We're using tank 1 for data on that. No impact to you.

SPACECRAFT Okay.

CAPCOM Columbia, Houston. We're 30 seconds to a 1 minute LOS over the states.

SPACECRAFT Okay.

CAPCOM Columbia, Houston. Back with you through Mila for 10 minutes.

SPACECRAFT Okay.

SPACECRAFT Boy, the folks who decided to put this velcro on the spacecraft really did the space program a service. I mean the additional velcro (garble) it's really handy.

CAPCOM Roger we copy that. And Ellison will be glad to hear it.

SPACECRAFT You can really see a lot of detail from this altitude George. Compared to Skylab. In Skylab you could only see freeways if there was some contrast. Here you can just see minor roads even. And you can see small settlements and when you get a building big enough where you can see an individual building with the naked eye.

CAPCOM Okay Jack good comment. Thanks.

END OF TAPE

SPACECRAFT windows fog up in the back and the camera was aiming through a fogged up window.

CAPCOM Yea, I copy that Jack, and we think we have a IFM type procedure that can handle that if you're ready for a short explanation.

SPACECRAFT I'm a little busy right now, not now, just a minute

CAPCOM Say again please.

SPACECRAFT Hold a minute. We changed, used camera Alpha instead of Charley for run 4 and 5. On the TV, we couldn't see anything visually although we didn't take a whole lot of time to get very dark a depth, but there was a straight streak upward at an angle of about 45 degrees or so that was visable and when we turned the gun off, I'm sure that was it. It was visable only on the TV monitor and we have VTR on that. It looks like it might have been headed right up toward the RMS arm which is up in that direction, really.

CAPCOM Okay, Gordo, we copy, thank you and appreciate this description.

SPACECRAFT Wasn't any hint of spiral or anything. At one point I thought I saw it spiral and I was jumping around, whooping and hollering about it, but I think that was some back lighting on the edge of the OMS pod. I just saw the edge of the OMS pod and not made me think it was coming from the VCAP but you were fairly close and at the bottom edge, but I'm pretty sure that's what that is. Cause it didn't correlat to the turn on, turn off.

CAPCOM Okay, we copy that, thank you. And Columbia we're looking at a thermal phenomena in the N2 system. Last night as the vehicle got cold we saw the N2 quantities that we'd compute drop about 20 pounds and we think you should have used about 1 pound in the cabin, then as we went to PTC after about 8 hours the usage leveled off again now and there's no impact if we really did lose that N2. We don't think we did. We're still looking at this situation. We'll let you know as it develops, over.

SPACECRAFT Okay, we haven't been breathing hard.

CAPCOM And Columbia Houston, for the back window, we've had someone over in the 1G trainer rig up a vent with the back of the world atlas. We have a plastic sheet there and uses that and some gray tape. We can tape it to the back of the overhead window, curve it around so that it's directing air from the vent that's between the overhead and the aft window down onto the aft window. And we just use the gray tape to hold that sheet up and

then bend it around and tape the ends of it closed so the air flow went across the back window and that we think that'll work pretty well if you could kind of do something like that.

SPACECRAFT Okay, use cover off of a book and just bend flow around to blow on the window, right.

CAPCOM Yea, that's affirmative, and we found that the back of the world atlas is a big plastic sheet,and that would work the best.

SPACECRAFT Okay, we'll see if we can rig up something.

CAPCOM Roger.

SPACECRAFT Makes it hard to put that window shade around there when you got that like that though.

CAPCOM Yea, we copy, and we'll be thinking about that. We're 30 seconds to LOS. The states are next at 2 plus 38.

SPACECRAFT Okay.

PAO This is Shuttle Control. Hawaii has loss of signal. Buckhorn picks up Columbia in 2 minutes. During this pass over Hawaii we did get the spacecraft power back onto the IECM experiment and we had a report from Gordon Fullerton on the VCAP beam search. He remarked that he thought for a moment that he was seeing a spiral beam but then he determined that it was back lighting off the OMS POD and it was still there when he shut down the beam. In an attempt to get the condensation off the aft windows CAPCOM George Nelson told Jack Lousma that he might be able to rig up a shoot to direct air from a vamp to the window and remove that condensation.

END OF TAPE

CAPCOM Roger, we copy, is there any color to it.

SPACECRAFT No, we couldn't see it visually. The streak we saw was on the TV picture only.

CAPCOM Roger, we copy that.

SPACECRAFT (garble) another (garble) here. We're not seeing anything this time. I don't know where there's a we're getting an illumination coming on the Orbiter now which is tending to wash it out on TV.

CAPCOM Roger, Gordo, we copy and we're 40 seconds through a short LOS through Orroral.

PAO This is Shuttle Control. Yarragadee has loss of signal. Orroral Valley will pick up Columbia in 30 seconds. The crew conducting the VCAP beam visual search during this night side of orbit number 34. 7 minutes left in darkness. Gordon Fullerton reporting that he could not see the beam visually but that he did see streak on the TV monitor during one of the generations of the beam.

CAPCOM Columbia Houston, back through Orroral for 2 and 1/2 minutes.

SPACECRAFT Okay, George, we've got pulse number 6 and 7 to go on this beam search. I noticed when Gordo put the command in from over on his panel that it doesn't change the command counter on the CRT display, like it says on the checklist. Maybe it's not supposed to.

CAPCOM Roger, we copy, Jack. Columbia Houston, Jack, the POCC is telling us that's a correct indication that it should not increase.

SPACECRAFT Okay, thank you. And how many minutes until daylight?

CAPCOM Roger, you're 5 and 1/2 minutes till daylight, Jack, and a minute and 1/2 till LOS here. One thing, we'd like to get the IECM fired up over Hawaii coming up, that'll be 2 hours 30 minutes, we'd like to get the aft payload main B back on. We'll try to remind again over Hawaii, over. And Columbia Houston, a reminder, we'd like you to wait for our call before turning the RMS heaters off.

SPACECRAFT Okay, now we got ....

CAPCOM Columbia, we're 30 seconds to LOS. Hawaii's next at 2 plus 29 and teleprinter message just coming up with entry weather, over.

SPACECRAFT Okay.

PAO This is Shuttle Control. Orroral Valley has loss of signal. Next tracking station to see the Columbia will be Hawaii in 14 and 1/2 minutes. At 2 days 2 hours 14 minutes mission elaped time this is Shuttle Control Houston. This is Shuttle Control at 2 days 2 hours 28 minutes mission elapsed time. Columbia nearing acquisition through Hawaii.

CAPCOM Columbia Houston through Hawaii for 6 minutes.

SPACECRAFT Okay, we're hearing you Hawaii and you wanted to do something with the IECM as I recall, George.

CAPCOM Roger, we'd like you to get payload aft main B on again now.

SPACECRAFT Okay, you got it, payload aft main B is on.

CAPCOM Okay, thank you, it looks like the IECM is drawing some current now and is up and running again.

SPACECRAFT (garble) on the VCAP operation we can see the filament (garble) clearly when it was turned on. We ran through the entire sequence as advertised there on the exposures except where we had jet camera Charley called out we substituted something bravo I guess. No, it must have been (garble), I wrote it down here. Just a minute. The other bummer on that one, George, is windows fog up in the back and the camera was aiming through a fogged up window.

END OF TAPE

CAPCOM And we're going LOS and Botswana is next at 1 plus 46.

SPACECRAFT Okay.

PAO This is Shuttle Control. Columbia's moved out of range of Dakar. Next acquisition at Botswana in 10 and 1/2 minutes. For a good deal of this pass there were circuit problems between the Goddard Space Flight Center and the tracking station at Dakar which prevented spacecraft downlink from reaching the control center. We did have communications about the last minute and 1/2 of the pass and pilot Gordon Fullerton will do the vehicle charging and potential beam search when Columbia reaches the night side of this orbit in about 6 minutes 45 seconds. Crew will attempt to see the electron beam that the generator is projecting out of the payload bay. We'll get a report of that perhaps at Botswana if the crew is able to see that beam. At 2 days 1 hour 36 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control. There'll be an informal Science Briefing at noon, central standard time, in Room 135 at the JSC News Center. Briefers will be Stan Olendorff of the Goddard Space Flight Center who will discuss the thermal canister experiment and Stan Shawhan of the University of Iowa who will discuss the plasma diagnostics package. That's an informal briefing on the thermal canister experiment and the plasma diagnostics package at noon central standard time today in Room 135 the JSC News Center. This briefing will not be carried either audio or video on NASA release circuits. Will not be carried on the release circuits. This is Shuttle Control at 2 days 1 hour 45 minutes mission elapsed time. Botswana will acquire Columbia in about 30 seconds for a very short low elevation pass.

CAPCOM Columbia Houston, short pass through Botswana and Yarragadee's next at 2 plus 03.

PAO This is Shuttle Control. We've had loss of signal at Botswana with no conversation, extremely short pass, less than a minute. Next station is Yarragadee in 16 minutes. At 2 days 1 hour 47 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 2 days 2 hours 3 minutes mission elapsed time. Yarragadee is about to acquire Columbia.

CAPCOM Columbia Houston, we're standing by at Yarragadee for 6 and 1/2 minutes.

SPACECRAFT Okay, standby. We'll be right with you.

CAPCOM Roger.

SPACECRAFT Okay, Blinky, we're looking at, we're doing column 4 of the procedure here.

CAPCOM Roger, we copy and we're standing by.

SPACECRAFT Should have a definite visual streak, a straight line streak, running upward into the right of the last series. This series is hard to tell, something's lighting up the Orbiter and maybe washing it out, I'm not sure where we're getting all this light.

CAPCOM Roger, we copy, is there any color to it?

END OF TAPE

SPACECRAFT rotation for a second.

CAPCOM Roger, Jack, you can go ahead and power that off. And Columbia we're 20 seconds LOS. Dakar is next at 5 minutes.

SPACECRAFT Okay.

PAO This is Shuttle Control. Columbia's out of range of Bermuda. Next station is Dakar in 5 minutes. During this pass we did some checks on the waste collection system which has some problems. We also got some other spectacular television from the elbow camera on the remote arm with J. Conner, the INCO on this silver team of flight controllers controlling the camera from the ground. The had an indication that the IECM is not on orbiter power, that experiment operates on batteries when not on the Orbiter power. We'd like to get it back on Orbiter power and we will work on that problem in an hour or so. Crew reported that there was still condensation on the aft windows and in one of the television shots we could see the condensation on the right aft window. Crew also reported that the cabin was chilly for a time last night but that it warmed up with no action on their part and it appears also that the OSS recorder has a malfunction. That's being studied. At 2 days 1 hour 25 minutes mission elapsed time this is Shuttle Mission Control Houston. This is Shuttle Control at 2 days 1 hour 28 minutes mission elapsed time. Columbia's approaching acquisition through Dakar.

CAPCOM Columbia Houston through Dakar for 5 and 1/2 minutes. Columbia through Dakar, how do you read?

CAPCOM Columbia Houston through Dakar for 3 and 1/2 minutes.

PAO This is Shuttle Control. There is a circuit problem between Goddard and Dakar. Problem is being worked now. See if we can get that solved before this pass ends.
CAPCOM Columbia Houston, with you through Dakar for a minute and 1/2.

SPACECRAFT Reading you, George.

CAPCOM Okay, Gordo, I read you loud and clear. We lost our land lines.

SPACECRAFT Okay, I'd heard you call all along. You want us to go ahead and do this VCAP visual beam search as soon as we get to darkness?

CAPCOM That's affirmative. And Columbia Houston, this is the information I promised you, something on your particles for the next minute. Because of APU 3 shutdown we didn't get a

complete dump of the right main engine after ascent and for this flight there's a new sneak circuit through the system through the LO2 bleed check valve and it's a little orifice about the size of a pencil lead and we're slowly venting some LOX through that valve and around the engine bells and it's coming out through the LOX's seal drain. Now mostly through the right engine but a little bit through the other two. We're assuming we did see some of this on STS-1 and 2, but not as much because we had a better dump. So what you're seeing is some LOX going out the back, over.

SPACECRAFT Okay.

CAPCOM And we're going LOS

END OF TAPE

PAO This is Shuttle Control. We have a television picture through the Merritt Island station now.

CAPCOM Columbia Houston, we're back with you for 10 minutes and Jack, we missed your last transmission, over.

SPACECRAFT Yea, it seemed to get kind of chilly in the cabin last night, but in the middle of the night and then it seemed like later in the morning it wasn't too bad. I thought I might have some other ideas on that but I was cold earlier in the evening last night.

CAPCOM Roger, we copy.

SPACECRAFT I felt about the same.

CAPCOM Roger, Gordo, and I'd like to know if you did anything to warm up the cabin.

SPACECRAFT No, we didn't do anything to warm up the cabin. I didn't want to put the other water loop on because I'd decided I'd wake up Gordo whenever I'd turn the CRT down, why, then we get a 10 minute tone.

CAPCOM Roger, we copy.

SPACECRAFT However, we have left the cabin heat exchanger pinned full hot and as I recall the air changer flow was max, as I left it last, can you confirm that?

CAPCOM Roger, Jack, we'll look into it. And we can confirm that, Jack.

SPACECRAFT Okay, so looks the only thing left is either leave off window shades and that makes it kind of hard to sleep or get the other water loop (garble) but maybe there's no (garble) warmer the cabin, we'll see.

CAPCOM Roger, Jack, let's hope so. Columbia Houston, Jack, can you confirm that you put the WCS controller handle up and forward?

SPACECRAFT Uh, I can't confirm that is forward, George, I thought you just wanted the mode switch.

CAPCOM Jack, we'd like you to take that up and forward and we still got plenty of time to look at the data.

SPACECRAFT Okay, were up and forward. The handle is up and forward and the slinger is rotating and trying to stop and running at irregular speed looks like.

CAPCOM Roger, Jack, we copy.

SPACECRAFT And I see a certain amount of paper rolling around in there, it might be that it doesn't like that paper.

CAPCOM Okay, Jack, we copy that.

SPACECRAFT (garble) giving this the once over with the elbow camera here.

CAPCOM Roger, Gordo, we're getting some beautiful shots here.

SPACECRAFT You can put that camera around 180 to the right and you get a great view of New York City as we look by.

CAPCOM Okay, we copy. Columbia Houston, Gordo, Are you back in the aft flight deck? Columbia Houston, how do you read? Columbia Houston, how do you read?

SPACECRAFT Houston, you called here loud and clear.

CAPCOM Okay, we must've dropped out for a minute. Gordo, if you're back on the aft flight deck I'd like you to verify some OSS recorder status for us.

SPACECRAFT Okay, go ahead.

CAPCOM Roger, Gordo, and we have a slight problem with that recorder. I'll read off some switches and you can tell me their status. The power on, the channel 1, channel 2 switches should be enabled with the lights on, over.

SPACECRAFT Okay, if you're talking about number 1 recorder that's good, power on, channel 1 and channel 2 footlights are on.

CAPCOM Roger, and tape recorder 2 should be in the same configuration, over.

SPACECRAFT The switches are on in the same configuration but the channel 1 and 2 lights are off.

CAPCOM Roger, we copy, and that's the problem we're seeing, standby. Columbia Houston, Gordo, we'd like you to take tape recorder 2 to off, O F F .

SPACECRAFT Okay, 2 power off now. It's off.

CAPCOM Thank you. Columbia Houston, we're 1 minute to LOS. Dakar is next and I have a short note of the particles you've been seeing if you want to listen.

SPACECRAFT Before you do that, you want me to turn the commode off. It's running real slow, though, 1 rotation per second.

CAPCOM Roger, Jack, you can go ahead and power that off.

END OF TAPE

PAO ...members of the press in room 135 at the JSC newscenter at 11:00 am Central Standard Time today. This will not be carried on the NASA release circuit. This is Shuttle Control at 2 days 1 hour 4 minute Mission Elapsed Time. Shuttle moving within range of the Buckhorn California station on orbit number 34. We expect television from the elbow camera of the remote arm during the Goldstone pass.

CAPCOM Columbia, Houston back with you through the states.

SPACECRAFT Okay read you loud and clear.

CAPCOM Roger Jack. We copy that. I've got a couple of questions for you. We're seeing a funny with the IECM, like to know if you waited the 30 minutes after you turned aft payload main B off and back on again. Over.

SPACECRAFT Yes I did.

CAPCOM Roger we copy and can you verify that payload main B is on now.

SPACECRAFT verified.

CAPCOM Okay thanks a lot. Is Jack on the middeck?

SPACECRAFT Yes, it's affirm, what can I do for you.

CAPCOM Okay Jack. We'd like to get the WCS in the low speed mode. That's in emesis and let it run for a while we'll take a look at it.

SPACECRAFT Okay you want a emesis and mode switched to WCS EMU.

SPACECRAFT All right.

SPACECRAFT The H2 Tank 2 unit.

CAPCOM That's affirmative.

SPACECRAFT It reads off scale high on the meter. And it's reading 107 high on the CRT also.

CAPCOM Roger copy. Off scale high on both.

SPACECRAFT That's affirm.

CAPCOM Columbia, Houston. It looks like the IECM didn't come back on orbiter power so in order to do that we'd like to get payload aft main B off and it's going to take about an hour and a half so we'll call you again when we want to get it back on. Over.

SPACECRAFT Okay and payload aft main B going off.

CAPCOM Roger.

CAPCOM Columbia, one other note of information we'd like to get from you guys, we're wondering if PTC last night helped the bulkhead warm up and whether you had water condensing on back windows or not. Over.

SPACECRAFT When I took the covers off this morning we put all the shades up George. I took off the shades of the aft windows and there wasn't any condensation and I noticed yesterday when we got out of the tail sun, the condensation tended to go away.

CAPCOM Okay Jack. Good report thank you.

SPACECRAFT There is condensation back with us now.

CAPCOM Columbia, Houston. Copy, you said that the window has condensate on it again.

SPACECRAFT The same little oval shaped pods in the middle of the window each aft window. It's a little smaller than they have been I guess about 7 inches by 5 eliptical shaped.

CAPCOM Roger and we've got a 30 second LOS coming up.

SPACECRAFT ....

END OF TAPE

CAPCOM .... pitch and encoder check 2 wrist pitch, over.

SPACECRAFT Okay.

CAPCOM And Gordo we can read you those addresses if you'd like.

SPACECRAFT Yea, why don't you.

CAPCOM Roger, and encoder check 1 wrist pitch address is 4527, over.

SPACECRAFT Okay, the actual is 0001.

CAPCOM Roger, we copy, actual 1. Encoder check 2 address is 452 delta, over.

SPACECRAFT 452 delta reads all balls, 0000.

CAPCOM Roger, we copy and thanks a lot. Columbia Houston, Gordo, that encoder check was on a number 1 and you're go to reset that with an item 12 and an item 11 on spec 94.

SPACECRAFT Okay. Now I'm sitting here with the (garble) inhibited also.

CAPCOM We copy that. Columbia Houston, the self stop is normal and that will clear when you take the brakes off and the encoder check was just a transient that occurred when you powered up, over. Columbia Houston we're 30 seconds to a 2 minute LOS over Australia, over.

SPACECRAFT Thank you.

PAO This is Shuttle Control at 2 days 36 minutes mission elapsed time. Yarragadee has loss of signal. Orroral Valley will see Columbia in 1 minute. We'll standby for acquisition there. Jack Lousma informing us over Yarragadee that a malfunction procedure that he worked on the monodisperse latex reactor was successful. That experiment is now working.

CAPCOM Columbia Houston's back with you through Orroral Valley for 4 minutes.

SPACECRAFT Thank you.

CAPCOM And Columbia, we'd like to change some variable parameters if you could get a GNC spec 1, over.

SPACECRAFT Yes.

CAPCOM Columbia Houston, the CRT is yours, thank you.

SPACECRAFT Roger.

CAPCOM Columbia Houston, we're 40 seconds to LOS. The states is next at 1 plus 05 and over the states we'll be planning on asking you to run the WCS in slow speed so we can watch it for awhile and we think we have an explanation of the particles you've been seeing and we'll try and get that up over the states also.

SPACECRAFT Okay, see you there.

PAO This is Shuttle Control. The Columbia has passed out of range of the Orroral Valley station. Next station is Buckhorn in 23 minutes. During that pass over the continental Unites States we will check out the waste collection system again. At 2 days 42 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control. Dr. Sam Pool, chief of the Medical Sciences division at the Johnson Space Center, will meet informally with the news media representatives at 11:00 a.m. central standard time in Room 135 at the JSC News Center. This meeting will not be on the NASA release circuit. To repeat Dr. Sam Pool, the Medical Sciences Chief, will meet informally with members of the press in Room 135

END OF TAPE

SPACECRAFT ...04 just about 10 minutes ago.

CAPCOM Okay we copy that. And Columbia, Jack for information the IMU alignment was good. There is no need for the IMU alignment called out in the CAP coming up.

SPACECRAFT Okay.

CAPCOM Columbia, Houston. We see the nozzle heaters heating up for the water dump. We'll be getting an alarm soon if we don't get the dump started. Over.

SPACECRAFT Yeah, dump's not done. We already got an alarm.

CAPCOM Okay we copy.

SPACECRAFT Okay the dump is started. And the temperature is coming down.

CAPCOM Copy thank you.

CAPCOM Columbia, Houston. Jack, on the MLR we'd like you to do a mal procedure that's in the payload systems data mal book. That's procedure 3.3 kilo on page 3-20 alpha. Over.

SPACECRAFT Okay I understand that. On page 3-20 alpha mal 3.3 kilo for the MLR.

CAPCOM That's correct.

CAPCOM Columbia, Houston. We're one minute LOS. Yarragadee is next in 10 minutes over.

SPACECRAFT (garble) this cryo tank (garble) test heaters are on in that configuration except of course H2 Tank 1B is a bad heater which is off.

CAPCOM Roger we copy Gordo.

SPACECRAFT However the tank 2 is also.

CAPCOM Copy.

PAO This is Shuttle Control. Columbia is out of range of the Indian Ocean station. Next acquisition through Yarragadee in 9 1/2 minutes. Jack Lousma reporting that he's deactivated the monodisperse latex reactor experiment had at talkback switch indication of a problem and we passed up information to him on where he look in the malfunction procedures to attempt to solve that situation. At 2 days 20 minutes Mission Elapsed Time this is Shuttle Control Houston.

PAO This is Shuttle Control at 2 days 28 minutes Mission Elapsed Time. Columbia is 15 seconds away from acquisition through Yarragadee.

CAPCOM Columbia, Houston back with you through Yarragadee for 6 minutes.

SPACECRAFT Okay George you got good news on the MLR. I did the malfunction procedure just as in the book and then went back to pre and we got a gray.

CAPCOM That's good news Jack thanks a lot.

CAPCOM And Jack, one more thing on the experiments. We'd like to get the OSS-1 tape recorder 1 track select into number 6 so we can watch it from the ground. Over.

SPACECRAFT Okay Gordo is getting that one.

SPACECRAFT Track 6. Recorder number one reads delta.

CAPCOM Roger copy delta. Thanks Gordo. And Gordo one thing on the RMS, we notice that we got an encoder check on the wrist pitch. There is no action required right now, however before clearing that fault we'd like to do a memory read and there is no time constraint on that. We'll be doing it the next couple of hours. Over.

SPACECRAFT Okay. I guess I hadn't noticed that. (garble).

CAPCOM Roger Gordo and we think it's a transient and no problem.

SPACECRAFT You want to call it to me now while I'm here.

CAPCOM Yeah, Roger Gordo. What we'd like to do is a GMEM read, that's called out in page 5-6 of the ref data book. And, we'd like to encoder check 1 wrist pitch and then encoder check 2 wrist pitch over.

END OF TAPE

PAO ...there's no active work for the Remote Manipulator System today. But, it will be placed in various positions so that thermal data may be gathered on the arm. At 1 day 23 hours 50 minutes Mission Elapsed Time, this is Shuttle Control Houston.

CAPCOM Columbia, Houston through Madrid for 5 minutes over.

SPACECRAFT ...Columbia, how do you read?

CAPCOM Roger Columbia, Houston, Gordo we read you loud and clear how me?

SPACECRAFT Okay loud and clear now.

SPACECRAFT Okay George, just about got the PDP powered up we're going to get the high voltage on now. The pressure is reading eight.

CAPCOM Roger we copy. It sounds good.

SPACECRAFT Okay George the PDP activation is complete.

CAPCOM Roger Jack we copy.

SPACECRAFT I guess you do want a tire pressure right?

CAPCOM That's affirmative.

SPACECRAFT And I initiated the fuel cell purge some time ago at 20:20:20, like to know if you see any anomalies there.

CAPCOM Roger Jack and the fuel cell purge looked real good to us.

SPACECRAFT Okay thank you.

CAPCOM And Jack, one minute left in this pass. We'd like to get the MET of enable OSS-1 tape recorder.

SPACECRAFT That was one minute after you said I could do it. 23:51 I believe.

CAPCOM And Jack. Copy. You had the MLR deactivated at 23:51. We need the time you enabled channel 2 on the tape recorder over.

SPACECRAFT That's what I just gave you. I haven't done the MLR yet, the one I'm doing now. The tape recorder was 1:23:51 and the status was off.

CAPCOM Okay thank you.

CAPCOM And Indian Ocean is next at 00+12.

SPACECRAFT Okay.

PAO This is Shuttle Control. Columbia is out of range at Madrid. Next station is Indian Ocean in about 12 minutes. Beginning with this pass down over Africa, crew of Columbia will conduct TACAN Test Tactical Air Navigation Equipment Test for the next several revolutions over Africa over Australia and over the United States. TACAN is the system they use during landing for range and bearing information. Crew reported the plasma diagnostics package powered up during this Madrid acquisition and the report at loss of signal was that the data looks good. At 2 days 1 minute Mission Elapsed Time, this is Shuttle Control Houston.

PAO This is Shuttle Control at 2 days 12 hours Mission Elapsed Time. Columbia is coming within range of the Indian Ocean Station now.

CAPCOM Columbia, Houston with you through Indian Ocean for 6 1/2 minutes.

SPACECRAFT Okay George, how do you hear.

CAPCOM Loud and clear Jack.

SPACECRAFT Okay I deactivated the MLR. And, one thing that didn't turn out right was that the talkback with the barberpole, when I put the switch to pre it didn't stay in gray. Is there something you want me to cycle?

CAPCOM Standby Jack.

SPACECRAFT And that was done at 00:04 just about 10 minutes ago.

CAPCOM Okay we copy that.

END OF TAPE

PAO station 10 seconds away.

CAPCOM Columbia Houston, the other team is with you over the states for 10 and 1/2 minutes.

SPACECRAFT Say again, Houston.

CAPCOM Roger, Columbia, this other team is with you through the states for 10 and 1/2 minutes.

SPACECRAFT Okay, and the DFI is there so you can check tire pressure.

CAPCOM Roger, we copy, Jack. And Columbia Houston, we owe you some numbers on water dump coming up. We can dump tank bravo only to 25 percent and you can start that at your convenience.

SPACECRAFT Ah, say the number again, it's coming in broken.

CAPCOM Roger, it's tank bravo to 25 percent, 2 5 percent.

SPACECRAFT Tank bravo 25. Thank you George.

PAO This is Shuttle Control. The CAPCOM on this pass is Astronaut George Nelson.

CAPCOM Columbia Houston, Gordo, we see an encoder check on a wrist pitch on the RMS, there's no action required now and we're working on a procedure and we'll get that up when it's required. Columbia Houston, we're seeing you on normal jets we'd like you to get back on the verniers, over.

SPACECRAFT Okay, George, (garble)

CAPCOM Roger, Jack, we copy and for our information have you changed out the batteries on the wireless comm recently?

SPACECRAFT Yea, the (garble) needs a new one and I put one in last night. Should be alright, but maybe it's not.

CAPCOM Okay, you're coming in loud and clear.

SPACECRAFT Okay.

CAPCOM Columbia Houston, one note we'll need to get the MLR deactivated sometime right after this pass. We suggest around 23:50. The procedure for that is on 4-37 in the CAP or we can read it up if you want.

SPACECRAFT Okay, say again the time, please.

CAPCOM Roger, Jack, anytime in the next 15 minutes.

SPACECRAFT Okay.

CAPCOM Columbia Houston, I'll have a small change to page 1-20 of the payload OPS checklist that's a PDP activation and I'll get that up when you have the book out.

SPACECRAFT Okay, you want to send us the change now?

CAPCOM Roger, Jack, on page 1-20 step 7 second line the tape didn't switch to the second track last night because we didn't get to the end so we'd like you to take TR2 track select to 21, the same as for the first act, over.

SPACECRAFT George, I'm not getting any of your transmission, try again will you please.

CAPCOM Roger, Jack, how do you read?

SPACECRAFT I'm reading you loud but you're kind of garbled.

CAPCOM Okay, Jack, how's this?

SPACECRAFT Okay, that's plenty better, now go ahead, George.

CAPCOM Okay, on step 7 on page 1-20, we didn't get to the end of the tape so we're still on the first track on tape recorder 2 track select, like you to go to stay on 21, over.

SPACECRAFT Okay, under track tape recorder 2 track select 21 first activation just leave it where it is.

CAPCOM That's affirmative.

SPACECRAFT Okay, gotcha, thanks.

CAPCOM Columbia Houston, we're 1 minute LOS. Madrid is next at 55 and for our information we'd like to get down the time of the MLR deact and we'd also like to get a status on how many EEVT's were done yesterday, over.

SPACECRAFT Okay, we did samples 1 and 2 yesterday, George, and I'll give you a time when I get to the ICOM MLR.

CAPCOM Okay, that's good news, thank you.

PAO This is Shuttle Control. Bermuda has loss of signal. Next station is Madrid in 5 and 1/2 minutes. Columbia is on orbit number 33. The remote arm being powered up during this pass. There's no active work for the remote manipulator system today, but it will be .....

END OF TAPE

CAPCOM Roger, Jack. Why don't we just at your convenience give us a call and we'll pass it up when you're down there sometime.

SPACECRAFT Okay what's the general idea.

CAPCOM Well we want to check the low speed operation for a little bit and then eventually go to high speed and check it for a little bit, hopefully it will work, and if it doesn't then we're going to have to go to the backup mode.

SPACECRAFT Okay we had it in low speed for about 30 seconds. It seemed to keep running.

CAPCOM Rog. The knowledgable folks seem to think they want it on for 3 or 4 minutes in the low speed before we go to high speed.

SPACECRAFT Okay.

CAPCOM Give us a call when you're ready to do that and we'll just pass it up.

SPACECRAFT Okay.

PAO This is Mission Control Houston, we're still in acquisition of signal period over Yarragadee. However, this is the breakfast hour for the Columbia crew so there's not a lot of dialog between them and Mission Control here in Houston. This pass does represent the last pass before the change of shift as Tommy Halloway and his crew of flight controllers prepare to handover Mission Control to Neil Hutchinson and his Silver Team of flight controllers. Mission Elapsed Time is 1 day 22 hours 59 minutes. We still have 2 1/2 minutes of signal remaining through Yarragadee, then a brief keyhole of about a minute and then we reacquire again at Australia's Orroral Valley station. This is Shuttle Mission Control.

CAPCOM Columbia, Houston. About 5 seconds to LOS we'll pick you up at Orroral.

SPACECRAFT Okay.

PAO Shuttle Mission Control. We're in that keyhole right now between Yarragadee and Orroral where we'll have loss of signal for about a minute and then pick up again Orroral for voice contact for about 4 minutes duration. Mission Elapsed Time is 1 day 23 hours 2 minutes. This is Shuttle Mission Control.

CAPCOM Columbia, Houston with you through Orroral for four minutes.

SPACECRAFT Okay about ready to do the alignment.

CAPCOM Roger. We're watching.

CAPCOM Columbia, Houston we're about 30 seconds to LOS. We see the IMU alignment in progress and it's looking good. That will save us some time later on this morning. The Ivory Team's enjoyed working with you this evening. We're looking forward to getting back with you again this coming evening. The other team, I forget their color is about ready to take over for us.

SPACECRAFT Okay, well thanks for sticking with us. Looks like you came up with a good plan and we'll do our best to execute it. See you next time around Dave. Thanks.

CAPCOM Okay Jack have a good day.

PAO With that salutation from CAPCOM David Griggs of the debriefing and handover between the two flight control teams now takes effect. Acquisition of signal will occur in 26 minutes at Mila tracking station for a pass of about 11 minutes duration. Mission Elapsed Time is 1 day 23 hours and 8 minutes. This is Shuttle Mission Control.

PAO This is Shuttle Control, Flight Director Tom Holloway has left the Mission Control Center and is on his way to the JSC newscenter for the change of shift briefing. That briefing scheduled for 9:30 am Central Standard Time in room 135, building 2. Change of shift flight control briefing 9:30 am Central room 135 JSC newscenter. This is Shuttle Control at 1 day 23 hours 37 minutes Mission Elapsed Time. Columbia approaching acquisition through the Merritt Island tracking station about 10 seconds away.

END OF TAPE

CAPCOM Reset the circuit breaker that you pulled and then inspect slinger for slow operation.

SPACECRAFT Okay, I'm going to have get that next pass, Steve.

CAPCOM Roger, understand, we'll pass it to you next pass at IOS in about 12 minutes.

PAO Shuttle Mission Control at mission elapsed time 1 day 22 hours 38 minutes coming up on acquisition of signal over the Indian Ocean station. Voice contact momentarily.

CAPCOM Columbia Houston, with you through Indy for about 6 minutes.

SPACECRAFT Okay, Dave, we're brushing teeth and loading cells and things like that, go ahead.

CAPCOM Roger, Jack, we don't want to interrupt what you're doing but we do have a procedure for the slinger, if required, if not, we can pass it to you later.

SPACECRAFT This is a good time, standby, let me get this stuff off my hands.

CAPCOM Roger. Columbia Houston, is Gordo on the flight deck?

SPACECRAFT Negative.

CAPCOM Roger, understand both on mid deck, thank you.

SPACECRAFT Okay, Dave, go ahead.

CAPCOM Roger, Columbia, the procedure for working the WCS. I'll start from the beginning again. On ML86B the subject circuit breaker, open it, WCS fan set to 2 and then WCS mode to WCS/EMU, copy.

SPACECRAFT Okay, I did that and it worked. At least the urination part works, (garble).

CAPCOM Okay, continuing with the procedure. Open the commode, inspect the slinger for blockages and clean if required. Upon completion of cleaning the Feces/emeses switch we would like in the emeses position, that's the low speed.

SPACECRAFT Okay, I look in there and it looks very clean. No, it's not clogged up, don't look like.

CAPCOM Roger.

SPACECRAFT We'll do the last thing.

CAPCOM Roger, copy, the slinger speed put to low, and then reclose the subject circuit breaker and inspect slinger for slow operation after the circuit breaker is closed.

SPACECRAFT Okay, it's in the emeses position and I'll close the circuit breaker.

CAPCOM Roger.

SPACECRAFT And now you want me to pull up on the handle of just to see if it'll to start turning, hey?

CAPCOM That's affirmative Columbia.

SPACECRAFT Okay, the slinger does turn in the slow position.

CAPCOM Roger, Columbia, and when you get a chance when you get upstairs stars 18 and 14 on the star table are good for IMU align and you're clear to proceed on that.

SPACECRAFT That'll be 18 and 14?

CAPCOM That's Charley and we're about 10 seconds to LOS. Yarragadee next at 9 minutes from now.

SPACECRAFT And when we use the commode do we leave it in emeses or do we got to put in back in feces, right?

CAPCOM Columbia, we're almost LOS, we'll talk to you a little more about that at Yarragadee.

PAO Shuttle Mission Control. Coming up on acquisition of signal over Yarragadee. We'll have voice contact momentarily. Mission elapsed time is 1 day 22 hours 54 minutes.

CAPCOM Columbia Houston with you through Yarragadee for about 7 and 1/2 minutes.

SPACECRAFT Okay, we got you at Yarragadee.

CAPCOM Roger, Jack, and we've got a couple more additions to the continuing saga of the WCS.

SPACECRAFT Okay, I'm not going to go down there right now. I've got some other things to do, but I'll copy it down.

CAPCOM Roger, Jack, why don't we just at your convenience give us a call and we'll pass it up when you are down there sometime.

END OF TAPE

PAO This is Shuttle Mission Control. In 15 seconds we'll coming up on acquisition of signal over the Madrid tracking station. Mission Elapsed Time is 1 day 22 hours 20 minutes.

CAPCOM Columbia, Houston with you through Madrid for about 6 minutes.

SPACECRAFT Buenos dias, Senor.

CAPCOM Como esta, usted.

SPACECRAFT Muy bien, y tu.

CAPCOM Columbia, Houston about 5 minutes to go, we've got some information here for you if you're ready to settle in and listen.

SPACECRAFT ...hold one.

CAPCOM Rog Columbia, and no pencil is required for this.

SPACECRAFT Okay, Jack's finishing (garble) let me get him to to stick his earphone in and then he can ...

CAPCOM Rog, give us a call when you're ready.

SPACECRAFT He's ready. Go ahead.

CAPCOM Okay. From the POCC, a congratulatory note, I'll read it to you for a couple of minutes here, the OSS-1 experimenters are all very excited about the excellent data they are getting. The would like to express their appreciation to Jack and Gordo for their terrific support they have given the OSS-1 experiments. The VCAP indicates the orbiter electrical potential is quite stable during beam firings. The PDP had found that the orbiter EMI is well within expected limits. Some electrons from the FPEG were seen during beam emission sequences. SIA is seeing an unexpectedly high sky brightness, but the contamination monitor package measures only a small contaminant accretion and PDP sees a low gas pressure. The SUSIM got a sun present signal during top to sun with less than 1/2 degree error signals. The TV pictures showed the x-ray windows and MFP foils in perfect condition. And the thermal canister experiment is also working well. Congratulations.

SPACECRAFT I guess the congratulations are due to the Goddard and those people for putting out a good machine.

CAPCOM Rog. They're all very pleased with it Gordo. Good flight so far.

SPACECRAFT Okay thanks.

SPACECRAFT Since it all looks so good, we'll just shut down the pallet and turn off the recorders.

CAPCOM I'm not sure it looks that good.

CAPCOM Columbia, Houston, we have a procedure on the slinger here if you're ready to copy.

SPACECRAFT Okay.

CAPCOM Roger. On ML86B the WCS controller main A we'd like open, select FAN SEP 2 on the WCS mode select WCS/EMU.

SPACECRAFT Okay. I got the breaker open and you want me to go to SEP 2 on?

CAPCOM Roger. FAN SEP 2 and we want to confirm that that circuit breaker is the WCS controller/slinger main A.

SPACECRAFT Yeah, that's the breaker I noticed it coming down to change the fan sepswitch that the handle's loose. It just comes off in my hand and maybe I can work around it. I found the shaft and I guess I can work it to number 2 now.

SPACECRAFT Do you want me to put FAN SEP 2 and then over to mode switch WCS/EMU and then what?

CAPCOM Okay Jack we're about LOS. If I don't get it all up to you we'll get the rest of it up at IOS, the remaining steps are open the commode, inspect the slinger for blockages and clean and then the feces emeses switch to emeses and then reset the circuit breaker that you pulled and then inspect slinger for ...

END OF TAPE

CAPCOM Columbia Gordo.

SPACECRAFT Go ahead.

CAPCOM Roger, we'd like you to reconfigure from the overnight UHF record position we were in in order to get voice record back on panel A1 audio center voice record channel 2 to ICOM A, please.

SPACECRAFT Okay, I'll do that.

CAPCOM And Columbia Houston, one more thing before we disturb you in your breakfast there, could you give us a brief rundown on MLR activities yesterday?

SPACECRAFT Okay, Dave, we had another slinger failure. I put the handle forward and ready to use. It worked for awhile and then it stopped itself again so it must be loading up there and I'll close the gate.

CAPCOM Roger, our sympathy's with you.

SPACECRAFT And I did turn on the MLR on time yesterday, Dave. And it all worked normally according to the checklist.

CAPCOM Roger, Jack, did you happen to hear the stirrer when you turned it on?

SPACECRAFT I didn't think to check, I'm sorry.

CAPCOM Okay, no problem, thank you for the data.

SPACECRAFT Okay, how about if I reset the commode breaker one more time and that'll at least allow the separator to work?

CAPCOM Standby, Jack, we're talking about it on the floor here.

SPACECRAFT Apparently what makes it pop is the slinger inside the commode is loaded up and is not turning real fast and pretty soon it just pops the breaker.

CAPCOM Roger, Jack, we've got 4 minutes before LOS. We'l have an answer for you here shortly.

SPACECRAFT You got voice record selection on ICOM A?

CAPCOM Roger, Columbia.

SPACECRAFT Channel 2. Channel 1 is still getting Air/ground 1.

PAO This is Shuttle Mission Control, about one minute away from acquisition of signal at Mila station, for a voice contact pass of about five and a half minutes. Columbia's on its 32nd orbit of the Earth. Mission elapsed time, one day 22 hours three and a half minutes. We'll have voice contact momentarily, this is Shuttle Mission Control.

CAPCOM Columbia, Houston back with you through Mila for about 11 minutes, and if you've had any chance to review the TPR messages, any questions we can probably answer them.

SPACECRAFT Okay Dave, I'm trying to plot again the time at which we stopped up....

CAPCOM Columbia, Houston Gordo we're picking up only three or four words and then a fade out for several seconds.

SPACECRAFT Okay, is this any better?

CAPCOM Roger, we got all that, go ahead.

SPACECRAFT Okay, how much of what's written for today...How much of written down here in the CAP for flight day three down to 23:15 do we do, all of it?

CAPCOM Columbia, Houston negative, negative, on flight day three we want you to do the activities on page 4-34 and 4-35 is all.

SPACECRAFT Okay, just finished breakfast and then that's after the next page, I got you.

CAPCOM Yes, just have your breakfast, on flight day three skip a day and then go to flight day four at that time.

SPACECRAFT Okay, how about if I try the commode breaker now Dave?

CAPCOM Rog, stand by on that Jack, are you down on the middeck?

SPACECRAFT Yes.

CAPCOM Okay, we'd like to verify a couple of things, can you tell us which circuit breaker is popped?

SPACECRAFT Yes, the Main A on MO86 Bravo, OBWCS Controller/Slinger

CAPCOM Roger, we copy that, and can you give us the position of the slinger speed switch?

SPACECRAFT Yes, the mode switch is off on the commode control is aft and down.

CAPCOM Jack, let me say again, the slinger speed switch i: it in the emisis or feces?

SPACECRAFT It's in the feces position.

CAPCOM Roger, stand by.

CAPCOM Jack, go ahead and attempt to reset.

SPACECRAFT Okay, the breaker reset, you want me to turn it on now?

CAPCOM Stand by. Rog, go ahead Jack turn it on.

SPACECRAFT Okay I'll go the mode to WCS EMU.

CAPCOM Roger.

SPACECRAFT Okay the stand is winding up alright and the separater and when I had the problem I was using the commode control switch in its normal position pulleys (garble) forward it was forward in use for about two minutes before it failed, do you want me to try to cycle that now?

CAPCOM Stand by Jack, were checking. Roger Jack we concur with that.

SPACECRAFT Okay, I'll just pull the handle up to get the slingers on okay?

CAPCOM Rog.

SPACECRAFT Okay the handles up, that's about 10 seconds, everything seems to be working okay.

CAPCOM Roger Jack, Columbia, Gordo.

SPACECRAFT Go ahead.

CAPCOM Roger we'd like.....

END OF TAPE

SPACECRAFT If you would give me a roll angle on a start time that would help some.

CAPCOM Okay, Jack, relative to the WCS you're go for a reset in the circuit breaker and we'll watch. Just a temp reset one time.

SPACECRAFT Okay, how about if we do it later. We don't need to use it right now and we're busy up in the flight deck.

CAPCOM That's fine. No problem.

SPACECRAFT And just give me a roll angle on a time to start, why it might make it better.

CAPCOM Okay, Jack, we understand. Our fault for not giving it to you for openers. Pointen's working up one right now. We'll have it to you before we leave Orroral here.

SPACECRAFT Okay.

CAPCOM Columbia Houston, we have roll information for you.

SPACECRAFT Okay, go ahead.

CAPCOM Okay, you can maneuver as soon as possible. Roll angle is 14.7. Standby. Correction, that's roll 147 and initiate the rotation at 1:21:50.

SPACECRAFT Okay, that'll be 147 and 1:21:50, thank you.

CAPCOM Roger.

SPACECRAFT And do you want that roll rate to be .135 or .134 like you said?

CAPCOM .134 that requires a change to DAP A 4.

SPACECRAFT DAP A got's .135 in it, that's why I asked you.

CAPCOM Yea, that's right. Change it to .134, Jack.

SPACECRAFT And the star trackers are working.

CAPCOM Roger, see that Jack, and you sound very good this morning. Sounds like you're much more rested.

SPACECRAFT Well, we're eager to get on with it, get it all done. We didn't want to leave anything out.

CAPCOM Roger, we copy, Jack, and as I said before we don' see any impact at all to the timeline by juggling these two days

SPACECRAFT Okay, that's good news.

CAPCOM Columbia Houston, we're 15 seconds to LOS. Mila's next in about 33 minutes.

SPACECRAFT Okay.

PAO This is Shuttle Mission Control. We've had loss o signal through Orroral Valley. During the pass over Australia the crew is instructed to turn to crew activities on flight day which appears on pages 4-34 and 4-35 in the crew activity plan. For the post sleep activity and the post breakfast activity flight date for activities listed on page 4-75 of the crew activity plan. Commander Jack Lousma was instructed to return Columbia to the nose sun configuration and roll and roll rate information we're uplinked to the crew. And some updated information for the digital autopilot was also communicated to the crew. The, of course, the nose sun data,the nose sun configuration intended for worst case thermal data to continue the thermal testing. Stars of opportunity for the inertial measurement unit were recited in order to expedite the IMU alignments and the crew will be reviewing teleprinter messages throughout the remainder of this loss of signal period with acquisition of signal occuring in about 28 minutes from now through the Mila station and a brief pass there with a contact for about 5 and 1/2 minutes. Mission elapsed time is now 1 day 21 hours 36 minutes this is Shuttle Mission Control.

END OF TAPE

(The Marine Corps Hymn)

CAPCOM How about that Columbia?

SPACECRAFT I'd say I liked the last part the best, and I'm standing up by the way.

CAPCOM Which way is up? Jack, I need your attention here for a little bit, we've got four of five things we need to get to you in the next three and a half minutes, if your ready to listen, and also copy.

SPACECRAFT Okay, I need a flight plan to copy somewhere, or should I take them on a separate sheet of paper?

CAPCOM Just a separate piece of paper would do it.

SPACECRAFT Okay, go ahead Dave.

CAPCOM Okay, starting from the top, keep you aware of what we intend on doing, we'd like you to perform flight day three post sleep activities through meal, that's CAP pages 4-34 through 35, except leave the RMS heaters in auto, that's in the post sleep activities. Item number two we'd like you to maneuver to nose sun as soon as possible, that's pitch plus 4.2, yaw plus 1.8, you can use the roll phasing nose sun Cue Card for the roll attitude, but we need to have you add two minutes to the orb, and that is due to launch, late launch, we also need to have you change the DAP, DAP A4, rotation discrete rate vernier to .134 when you get there.

SPACECRAFT Okay, I understand.

CAPCOM Okay item 3, we'd like to get some stars of opportunity for an IMU align, which would save us time later on in the day. The star tracker currently is in term idle from the IMU align you did last night. We need to have you activate it at spec 22 select star track, and then manually cycle the shutters open then auto to reset the target supress.

SPACECRAFT Okay, I understand that one.

CAPCOM Okay, after that it's review the TPR messages if you havn't done it yet, and have yourself a good breakfast. After breakfast, we'd like you to pick up on flight day four activities, CAP pages 4-57 at 23:15, as modified per CAP update message number 15.

SPACECRAFT Okay, I'm looking at that message right now, I've started to put those changes in my CAP. I hope what we're doing wasn't going to through mess up for the total output of the

mission, are we gonna be able to cycle day three into day four tomorrow okay?

CAPCOM That's the plan Jack, and just to keep you aware o what's happening we're all go down here, we don't see anything wrong with swapping these around and it's just a minor change as far as were concerned.

SPACECRAFT Okay, give us a little time to get our paper work squared away, and I will however maneuver to nose sun immediately, and is it alright to reset the circuit breaker on the commode?

CAPCOM Stand by on that one? Do you need it?

SPACECRAFT Maybe that was a bad choice of words. Is it okay to reset the circuit which operates the commode?

CAPCOM We'll check on that Jack, stand by.

CAPCOM Jack, we're about LOS we'll let you do that at Orroral in oh just a couple minutes here.

SPACECRAFT Okay.

PAO This is Shuttle Mission Control, we're passing through a little keyhole between Yaragadee ground station at Yarragadee and ground station at Orroral Valley, it represents loss of signal of less than a minute and we shall reacquire agai in appromxiately twenty seconds. During that pass, a number of flight notes were passed up to the crew. Stand by for a voice contact here with mission elapsed time at 1 day 21 hours 29 seconds this is Shuttle Mission Control.

CAPCOM Columbia, Houston back with you through Orroral fo about four and a half minutes here and we're still researching the WCS.

SPACECRAFT Okay.

END OF TAPE

PAO ...sample and operating the electrophoresis test equipment. In approximately 20 seconds, we will begin acquiring data at the Bermuda ground station and again, that possibility o voice contact with the crew. Mission elapsed time is presently day, 20 hours, and 36 minutes. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control. We've had a loss of signal over Bermuda ground station. Obviously the crew elected not to initiate voice contact in that pass. Still (garble) in the sleep period. The data processing systems engineer reported that there was no indication of activity in th cathode ray tube displays during that pass and that all systems and electrical current drains were quiet onboard Columbia suggesting that the crew is continuing to take advantage of this rest period. We will have acquisition of signal again over Madrid in approximately 6 minutes. This is Shuttle Mission Control at mission elapsed time, 1 day, 20 hours, 41 minutes.

PAO This is Shuttle Mission Control. The cumulative effect of the extended sleep period and loss of signal means tha it's been practically 9-1/2 hours since we've had voice contact with Astronauts Lousma and Fullerton. Flight Director, Tommy Holloway has instructed the capsule communicator to initiate voice contact with the crew through the ground station at Yarragadee (Australia) and we will have acquisition of signal through Yargadee in just a few moments and this will represent the first voice contact we've had with the crew since the expiration of that sleep period. Mission elapsed time is 1 day, 21 hours, 20 minutes, 23 seconds. This is Shuttle Mission Control. We'll have voice contact momentarily.

CAPCOM Good morning Columbia. We've got you through Yarragadee. How do you read?

SPACECRAFT Good morning Dave, top of the morning to you at Yarragadee. Read you loud and clear, how me?

CAPCOM Very good Jack. We just couldn't wait any longer. And we're listening if you've got anything for us.

SPACECRAFT Say again please.

CAPCOM We're listening if you have anything for us.

SPACECRAFT Okay. We slept a little better last night and we've been up and around a little bit. We aren't totally ready to go yet but can be very shortly. I presume we ought to get in the nose sun attitude pretty soon. One other malfunction we've had is the commode stopped working while it was being used. The motor quit running. I checked the circuit breaker in MOA6B and it is open.

CAPCOM Okay Jack. We copy that. And Jack we've got some special music here this morning that you might be interested in listening to if you're ready.

SPACECRAFT I'm always ready. I'm sitting here making your teleprinter updates and will do it to the music.

CAPCOM Okay. At the completion of the music, we'll have a few things to pass up to you voice also.

SPACECRAFT Okay.

CAPCOM (Music) (Marine Corps Hymn)

END OF TAPE

PAO This is Shuttle Mission Control. The clock shows approximately 30 minutes remaining in the sleep period, however the data received here in the control center shows current usage which indicates the flight crew had Cathode Ray Tube displays on and has been manipulating the keyboard units acquiring data from the vehicle and in all probability there is a waking activity onboard Columbia at this time. We will have acquisition of signal in slightly less than five minutes over the Bemuda ground station and according, that their is some possibility of voice contact during that pass. The new flight day three summary time line has been drawn up by the flight crew in here. It shows the sleep period ending at 2 days 21 hours mission elasped time, which is roughly thirty minutes from now. At that point, post sleep activity begins for both pilot and commander. This typically consists of configuring crew cabin, lighting and adjusting window shades over the flight deck windows. Some house keeping functions, storage and unstorage of documents and crew activity plans and checklists and activity of that nature. Helping the crew get ready for the days events. At mission elasped time 2 days 21 hours 45 minutes. The summary time line shows the commander and pilot both reviewing teleprinter messages which have been uplinked to them. Part of which will be the new summary time line for the new day three events. At mission elasped time 2 days 22 hours, commander Jack Lousma is to maneuver Columbia into the nose sun attitude, taking it out of the passive thermal control configuration that it has been in throughout the sleep period. And manuevering it again to the nose sun attitude to get some more of those extreme thermal data readings. The crew is then scheduled to have breakfast until mission elapsed time 2 days 23 hours. Following that, Commander Jack Lousma will take some plant growth unit data readings,will perform a fuel cell purge, will activate the plasma diagnostic package, then has some responsibilities pertaining to this 16 mm unit setting up, activating and deactivating that 16 mm film camera, an IMU alignment. And at mission elapsed time 3 days and about 40 minutes is scheduled to perform some exercise activity and the treadmill onboard the Columbia's middeck. Meanwhile, activities like on the pilot Gordon Fullerton after breakfast which again is scheduled at the same time as it is for the commander. At mission elapsed time 2 days 23 hours 15 minutes Gordon Fullerton is to perform a supply dump followed by unstowing the remote manipulator system, then activating the RMS heaters. He also has an exercise period at mission elapsed time 3 days and 15 minutes and is to perform some short wave TACAN functions following that exercise period. He is then scheduled to do some work on the electrophoresis experiment in preparing the sample and operating the.....

END OF TAPE

PAO Columbia is approaching its 29th orbit of the Earth. The vehicle is still configured in a wing over wing roll at a rate of one revolution every two hours. The downlink data acquired at Guam indicates that the Columbia's orbital velocity is 25,469 feet per second at which speed it circles the Earth every hour and a half. The orbital apogee is shown to be 134.26(nautical miles. With a perigee of a 129.38 nautical miles. The temperature in the flight deck is steady at 75 degrees and the humidity is 42 percent. Mission elasped time is 1 day 16 hours 49 minutes. And there is slightly more than four hours remainin in the astrounauts sleep period. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control. Indications continue to suggest that its been a restful evening for astronauts Jack Lousma and Gordon Fullerton, on either Columbia's alarm systems or mission control. Flight teams have had to awaken the crew thus far th"o¢gh their sleep period another one hour and fifteen minutes remains through their nominal sleep period before the crew is expected to awake. Flight controllers budgeted a nine hour sleep period for the crew. One hour longer than originally planned as (garble) for the unexpectedly long and busy day the crew had spent in space yesterday. Mission elasped time is now 1 day 19 hours and 15 minutes. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control, Columbia's just passed over the tracking station at Orroral Valley in Australia. Downlink data has been analyzed by the flight control team. Flight director Tommy Holloway is pulled each of the positions in Mission Control Center and each indicated good data from the vehicle. Indication five that the one of the (garble) onboard Columbia has been turned on and there has been some keyboard activity up there which suggests one of the astronauts is awake and gathering some data. There is just one hour remaining in this extended nine hour sleep period for the space shuttle astronauts and the flight control team is putting final touches on the revised flight plan for day three. In essence the activity plan will exchange day three and day four giving the crew a milder work schedule for today. No remote manipulator system tests as scheduled rather the exercise of grapaling with and deploying the plasma diagnostic package will be defered until day four. Flight effort to advoid promotting crew fatigue this early in the flight. One hour does remain in the extended nine hour sleep period. Once again at least one of the astronauts are awake at this point and have been manipulating the CRT's. I can't really tell by the, which astronaut it is or whether he's going back to sleep or continuing to gather data. Phase lasped time at this point is 1 day 19 hours 59 minutes. This is Shuttle Mission Control.

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PAO This is Shuttle Mission Control. Flight Controllers here in Mission Control center have analyzed the S-band data which has been downlinked from Columbia to the Santiago, Chile station determine systems onboard Columbia are performing nominally. Indications are there have been no alarms, or no events which would have disturbed the crew's rest. There are six hours and forty minutes remaining in the sleep period. Another data pass coming up in about four minutes as Columbia overflies Ascension Island and has about seven minutes of data acquition over Ascension. Mission elasped time is 1 day 14 hours 19 minutes. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control. Systems onboard the spaceshuttle Columbia continue to perform normally while astronauts Jack Lousma and Gordon Fullerton sleep. As Columbia passes ground stations, system status data are telemetered down from the vehicle for analysis here in the mission control center. And in this manner the flight control team is able to monitor the vehicle systems and alert the crew to problems which might occur. And of course addi 1K/+ the orbiter has an alarm system onboard which would awake the astronauts and direct their attention to problem areas. Telemetry shows that temperature in the Columbia's cabin is presently 76 degrees and steady and the humidity is at 42 percent. Mission elasped time is now 1 day 15 hours. Columbia is on its 27th orbit of the Earth. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control. Approximately five hours remaining in the astronauts sleep period. Four hours having been elapsed. The flight control team has planned significant changes for flight day three activities by Columbia's astronauts, Jack Lousma and Gordon Fullerton. The flight plan has been modified with the principal objective of giving the air crew more leisurely day, following yesterday's very busy day in space. The plan is essentially an exchange of activity scheduled on flight days three and four. This means that grapling and deployment of the plasma diagnostic package originally scheduled for the third flight day will be postponed one more day. Grapling and deployment of the induced environmental contaimation monitor has been cancelled for this flight due to loss of one of the aft payload bay cameras, in as much as the IECM is not visible to the astronauts through the rear windows and the flight deck. Consequently, no remote manipulator system activity will be performed during flight day three. Downlink data continues to indicate that onboard systems are performing nominally on Columbia. And the astronauts are apparently spending a restful evening under interrupted by any onboard alarms. Mission elasped time is now 1 day 15 hours 58 minutes. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control. We have just completed a data acquisition pass over the tracking station at

Guam. And flight director Tommy Holloway has pulled all the console positions to determine that all systems aboard the vehicle are continuing to perform nominally. And has been assured that is the case. As astrounauts Jack Lousma and Gordon Fullerton spend their second night in orbit, approximately mid way through their sleep period, the Columbia is approaching its 29th orbit of the Earth. The vehicle is still configured in a wing over wing roll at a rate of one revolution every two hours. The downlink data acquired at Guam indicates that the Columbia's orbital velocity is 25,469 ft per second. At which speed it circles the Earth every hour an a half. The orbital appogee is shown to be a 134...

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PAO We are now in a loss of signal period. We will acquire signal again in about 28 minutes. That really concludes voice contact with the crew as we expected, and as in much as th sleep period is scheduled to begin in just about 20 minutes. They plan to have a nine hour sleep period tonight with the option to sleep in later if they so desire but as Jack Lausma adds, indicated earlier this evening its kinda difficult to slee up there making reference to the commanding view they have of th Earth's passing beneath the panoramic windows in the Columbia. Although the crew will be asleep and will not have voice contact under nominal conditions during this period, the Columbia telemetry will continue to downlink data which will be looked at here in the Mission Control Center althrough the night as the telemetry monitors the health and well being functions onboard the vehicle and continues to assure flight controllers that the vehicles systems are working as expected. Mission elasped time is now 1 day 11 hours 40 minutes. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control. Mission elasped time is 1 day 12 hours, 55 minutes. We are of course in the sleep period now about eight hours remaining of the scheduled nine hour sleep period, although mission control planes to let the flight crew initiate dialogue tommorrow morning and to let them sleep late if they so desire. We are in a rather long loss of signal period of more than a hour. Presently as the vehicle is preparing to cross into South Africa but the flight path on this pass is such that the Columbia passes right between the ground track of the Ascension Island and Botswana and also misses the Indian Ocean station. And we'll not reacquire signal again until it encounters the Santiago, Chile ground station site in approximately an hour and twelve minutes from now. During this loss of signal period the flight control team here in the mission control center under the direction of flight director, Tommy Holloway is looking at the flight plan for tommorrow for day three and making modifications and adjustments to it with the purpose of giving the crew a lighter workday tomorrow. And the essence of those changes will be to exchange activities on flight day three and day four. The control team is designing a minute by minute flight plan which would be uplinked to the Columbia crew on, by use of their onboard teleprinter in advance of the wakeup tommorrow. Mission elasped time is now 1 day 12 hours, 57 minutes. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control we're just about seven and a half minutes away from acquisition of signal over Santiago, Chile. And of course the crews asleep and has been for the last two hours in its sleep period. But this will represent the first look at data that the flight control team has had in just about an hour and a half. We had loss of signal for a little over an hour and thirty minutes and of course even though the crew's asleep, Columbia continues to

telemeter data down to Earth stations. And as we go over Santiago, Chile we will get that telemetry and it will be relayed to the mission control center here in Houston and give the flight controllers an opportunity to verify that the systems onboard Columbia continue to work nominally. And we're just about seven minutes away from acquiring that data, when the data does begin to come in we shall report on the status of the vehicle as indicated by the information displayed before the flight control team. Mission elasped time is presently 1 day 14 hours, 2 minutes. This is Shuttle Mission Control.

END OF TAPE

CAPCOM (garble) a couple of other little ditties, your state vector is good to the first Northrup opportunity, orbit 32 and finally just a rough cut at tomorrow's activities. It looks like what we're going to probably do Jack, is change flight day for flight day 3 and that'll mean no PDP operations for tomorrow

SPACECRAFT I see. Sounds like a good plan Dave.

CAPCOM Okay Jack, and once again, just to remind you, the Silver Team is not coming on until an hour late from the normal taps, so we definitely want you to sleep in an hour and any more that you want after that.

SPACECRAFT Okay. Where's wakeup time around Dave?

CAPCOM Standby Jack, we'll give you maybe a proposed wakeup, but once again, we expect you to call us vice us calling you.

SPACECRAFT Okay. Probably around 2200 somewhere (garble)...

CAPCOM Roger Jack, and we don't intend to get started on the CAP until after 2200.

SPACECRAFT Okay, and I take it you like our rotational rate and attitude and the whole works for the night. Okay?

CAPCOM It all looks good at this time Jack.

SPACECRAFT Okay. That's good. Well we're winding it up, putting things away and finding ourselves a place to sack out. And I think we all got a pretty good day done in spite of the fact that we didn't feel all that great. I think this was a good day to not feel that way.

CAPCOM Okay, we're chuckling over that Jack and if you'd like, relative to the speaker box configuration, you might want to check that on the flight deck one more time, and if you can get it operational, that's the way we would like you to sleep. Once again, if you can't get it op, we'll have to go without it.

SPACECRAFT I can't think of anything more to do than all we've been doing and unless you've got some good ideas.

CAPCOM The only suggestion we've got Jack is to make sure that you don't have a mike input into it. And that's on the OS?

SPACECRAFT Yeah, that's the one we're talking about.

CAPCOM Roger. Jack, looking at the diagrams on that speaker system, we'd like you to check the OS audio panel to make sure that it's configured properly for that speaker if you

haven't done it yet.

SPACECRAFT Yeah, we got the OS audio panel and speaker and PT on, we got A/a1 and UHF on it. We got (garble) audio tone. Don't know what more to do with it.

CAPCOM We can't do any better than that Jack. It looks like another piece ofpsvace hardware has failed. We've got about 30 seconds to LOS. The Ivory Team says goodnight, sleep tight, we'll see you tomorrow.

SPACECRAFT Okay. We're thankful you guys are minding the store and we will see you tomorrow. Have a good evening. (garble)

CAPCOM Columbia Houston, we'd like channel 2 audio UHF.

SPACECRAFT Okay, we'll get it.

SPACECRAFT Okay Jack, we see it. See you tomorrow.

PAO This is Shuttle Mission Control. Mission elapsed time 1 day, 11 hours, 37 minutes. During that pass it was determined that the speaker box on the flight deck was inoperative. The flight control team wants to have both boxes on the middeck and the flight deck operative in order for the crew to have a redundant system onboard during the sleep period. Failure of the flight deck speaker box to work means that the crew will be in the headsets during the sleep period tonight in case there needs to be a wakeup call made for any contingency. Crew was also advised during that pass that the flight plan modifications will be made during this sleep shift and essentially the plan is to switch flight day 3 and flight day 4 which has the effect of deferring PDP, or plasma diagnostic package deployment which would have been scheduled for tomorrow but will now occur on flight day 4. The purpose being to give the crew a comparatively easy day tomorrow and let them rest up and recover a little bit after the somewhat vigorous day they've had onboard today. We're now in a loss of signal period. We'll acquire signal again in about 28 minutes. That really concludes voice contact with the crew as we expected in as much as the sleep period is scheduled to begin in just about 20 minutes. They plan to have a 9 hour sleep period tonight with the option to sleep in later if they so desire, but as Jack Lousma had indicated earlier this evening, it's difficulty to sleep up there making reference to the commanding view they have of the Earth passing beneath panoramic windows in the Columbia.

END OF TAPE

CAPCOM no SM checkpoints required tonight, that might save you a couple of minutes.

SPACECRAFT Alright, and are you finished looking at the tile pressure here Dave?

CAPCOM Standby. Ok, that's affirmative Jack we got the tile pressures and we're about 15 seconds now from LOS, we'll pick you up at Botswana in about 15 minutes.

SPACECRAFT Ok.

PAO This is shuttle mission control, mission elapsed time is 1 day 11 hours 6 minutes. Had loss of signal through Santiago ground station. During that pass the crew reported satisfactory closure and opening of the payload bay doors. Data showed that the latch configuration was nominal and temperatures were nominal constraints which of course produced sensational release and relief here in the mission control center and as commander Gordon Fullerton indicated also onboard Columbia, they reported closure time for the doors was 54 seconds which indicated 2 motor time that both motors were working well to affect the door operation. The crew indicated that they didn't feel like they were over pressed during the day although it certainly has been a vigorous day onboard Columbia and the plan for tomorrow morning is communicated by Capcom David Griggs is to let the crew sleep in at least for an hour and to let them initiate morning contact. Essentially letting the crew sleep in as late as they desire. Silverteam flight director Neil Hutchinson has left the control center and on his way over the NASA news center for a change of shift briefing at this time. The change of shift briefing will occur on time at 9:15 with flight director Neil Hutchinson and with Dr. Sam Pool, chief of medical sciences here at JSC. Again that change of shift briefing at 9:15 p.m. just approximately 7 minutes from now in building 2 room 135. Acquisition of signal in about 14 minutes from now through Botswana. Mission elasped time is now 1 day 11 hours 8 minutes, shuttle mission control.

PAO This is shuttle mission control in 5 minutes flight director Neil Hutchinson and Dr. Sam Pool, chief of medical sciences division at JSC will conduct a change of shift briefing in building 2 room 135 the JSC news center. Mission elapsed time 1 day 11 hours 10 minutes, this is shuttle mission control.

CAPCOM Columbia Houston with you through Botswana for about 4 and a half, over.

SPACECRAFT Ok, Dave just a minute I got some times where my lecture appears on the optic quarters.

CAPCOM go ahead.

CAPCOM Roger, Columbia

SPACECRAFT 13 and I have it at 11:20. I thought everything from start to finish cause I couldn't remember how much I did or what was what, before.

CAPCOM Ok Gordo we copy, 11:13 through 11:20.

SPACECRAFT Also, I don't know if it's necessary for you to have some comparison to our light numbers of the post insertion book, we can dig those out if you like.

CAPCOM Standby Gordo, we'll think about that for a minute. Gordo, we don't require that at this time, we may ask for it later, but we'll let you know.

SPACECRAFT Ok.

CAPCOM And Columbia Houston for Jack, we recommend that you go on the speaker mike tonight vice the normal setup.

SPACECRAFT You mean the speaker box.

CAPCOM That's affirmative, speaker box.

SPACECRAFT Nobody's tried to give us a call over here, you want to try to give us a call on it.

CAPCOM Ok, go ahead.

SPACECRAFT Ok, Dave why don't you give us a call and we'll see if we can hear you on this middeck or the flight deck speaker box.

CAPCOM Roger, Columbia Houston, talking to you through the speaker box, how do you read?

SPACECRAFT Don't hear you.

CAPCOM Roger, Columbia Houston throught the speaker box how do you read?

SPACECRAFT Standby. Ok, try it again Dave.

CAPCOM Columbia Houston through the speaker box, how do you read?

SPACECRAFT No joy.

CAPCOM Roger, do you have UHF selected?

SPACECRAFT Yeah.

CAPCOM Roger, through the speaker box, one more time, how do you read?

SPACECRAFT Roger, I don't hear you, maybe on the middeck, we don't hear you up on the flight deck.

CAPCOM Ok, I guess it's a good thing we checked it like you suggested.

SPACECRAFT Played around with this a little bit yesterday and never heard a peep out of it. Are there any circuit breakers any where on that one?

CAPCOM We're looking at that Gordo, we may have some more information for you by IOS.

SPACECRAFT Ok, try us one more time, Dave.

CAPCOM Roger, Columbia, through the speaker box, how do you read?

SPACECRAFT Ok, I heard you very well on the middeck speaker box, I just had to take my mike off, however,

CAPCOM Ok, Jack we copy and we're about 20 seconds now from LOS, we'll pick you last pass at IOS in about 3 minutes here.

PAO This is shuttle mission control, mission elapsed time 1 day 11 hours 26 minutes. We've had loss of signal, we'll acquire again in 3 minutes through the Indian Ocean station. During that pass Columbia pilot Gordon Fullerton reported that he had put on the onboard voice recorder the product of his theodilite readings, which he took earlier, measurements with the essentially an optical surveys instrument to measure the degree of deflection in the payload bay doors during the heating tests by using

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PAO ...at this junction, the crew is about 1 hour overdue for its sleep period. The plan is to get them to bed in approximately an hour and to let them sleep in as late as they desire tomorrow morning, at least an hour late, to give them an opportunity to catch up on their rest they've missed today. We shall have acquisition of signal at Santiago momentarily. Mission elapsed time is 1 day, 10 hours, 59 minutes. This is Shuttle Mission Control.

CAPCOM Columbia Houston with you through Santiago. Over.

SPACECRAFT Hello there through Santiago. Welcome aboard.

CAPCOM Okay. Glad to be with you Jack.

SPACECRAFT Gordo's got some good news on the door business. It all worked right.

CAPCOM Super. We're all very glad to hear that down here

SPACECRAFT You're not any gladder than we are brother. We started the door closed. The (garble) had cleared up and all the latch indications were now all door closes. In 54 seconds...and we got the latches all back together in 29 seconds, so nominal indications; we opened them and opened the door and the port radiators were backed off normally.

CAPCOM Okay Gordo. That sounds good to us, good news to us. We've got some good news for you. The plan is for tomorrow that we're gonna let you sleep in. You call us. We won't call you, and the plan is that we're gonna build a new flight day 3 for you tomorrow that will be thoroughly relaxed and hopefully we'll get you back onto schedule where you can eat and sleep according to the way the timeline was to begin with.

SPACECRAFT Okay. Well, if we get to feeling better, we'll be ready to charge. Actually we weren't overpressed today, I don't think. We had all the food we wanted today. I think we're going to be feeling better tomorrow Dave, but we thank you for your consideration and we'll just play that one by ear. I don't know, it's pretty hard to sleep in up here.

CAPCOM Okay. We copy Jack and the plan still is you just give us a call when you're ready. We plan on letting you sleep in. A couple of things we do need to get done tonight though. The fuel cell purge, if you haven't done it, still needs to be done.

SPACECRAFT That's either in work, or complete. Complete, let you take a look at the numbers.

CAPCOM Okay. We'll look. And Columbia Houston, we'd like

you to repress the left oms through the A-leg at this time.

SPACECRAFT Okay, I'll do that. I guess the thing that was most bothersome for me last night was that I was sleeping with a earphone on and every RAF, there would be some spurious noise when we were at our higher latitudes over Iran and around in China and in there. If there was a way to avoid that it would b good. It wasn't any UH...Somehow there's something sneaking in there that's making it into my headset.

CAPCOM Roger Jack. We copy all that.

SPACECRAFT Had the same character as when you're driving alon in an airplane and somebody paints you with radar.

CAPCOM Roger. We're familiar with those kind of sounds. At least myself and you too, I know, and we just finished another discussion down here. It is our definite plan not to start until an hour later tomorrow.

SPACECRAFT Okay. I guess that's forced retirement. We'll find something to do. Don't worry.

CAPCOM Okay. The Silver Team says they need an extra hour's sleep and that's the reason why Jack, so we're gonna give it to you too, at least.

SPACECRAFT You guys are all heart. Tell Terry that I've been wearing his calculator on my knee since yesterday afternoon and using the AOS and it's working great.

CAPCOM Okay. He copies Gordo.

SPACECRAFT Would it help you all if I reread those door numbers onto the recorder and you can pick them up tonight?

CAPCOM Standby Gordo. We will think about it here. Okay Gordo, that would help us. If you've got time, go ahead, and one other small thing, no SM checkpoints required tonight. That might save you a couple of minutes.

SPACECRAFT All right. And are you finished looking at the tire pressure here Dave?

CAPCOM Standby.

END OF TAPE

CAPCOM We were hopeing for the results of your payload ba door closing.

SPACECRAFT We haven't gotten around to it Sally. I just wasn't thinking.

CAPCOM Okay we copy and we would like you to terminate th water dump at this time please.

SPACECRAFT Okay I just got the liner changed and I'm on my wa to do that.

CAPCOM Okay very good.

SPACECRAFT Okay we're going to open the doors after we get ri of all the other little things done, we get after the big one now.

CAPCOM Roger we understand and there's no problem with that. And Columbia with 40 seconds left looking at the flight plan for tommorrow we're planning to let you sleep for an extra hour in the morning before we start the day. And the data here shows the IMU's look good after the alignment and we see MPTC looking fine.

SPACECRAFT Okay good thank you.

CAPCOM And we're 20 seconds to LOS. Santiago is next in 20 minutes.

SPACECRAFT See you at Santiago, Sally.

CAPCOM Okay.

PAO This is Shuttle Control. Columbia is out of range of Hawaii. Next acquistion through Santiago in 19 and a half minutes. The crew has not yet cycled the port payload bay door. They're getting ready to do that at this time. We informed them during this pass that we will give them an extra hour of sleep tommorrow morning. EECOM reporting now that the temperatures have risen about 30 degrees in the payload bay area, since going to top sun and then passive thermal control attitude. We're one hour and eighteen minutes away from the start of the crew's sleep period. And eighteen and a half minutes away from acquisition through Santiago, Chili. At 1 day 10 hours, 41 minutes mission elasped time, this is Shuttle Control Houston.

PAO This is Shuttle Control. Flight Director Neil Hutchingson estimates his change of shift briefing for 9:15 p.m. central standard time in room 135 at the JSC newscenter. Change of shift briefing with flight director Neil STS-3 AIR/GROUND

Hutchingson.

PAO This is Shuttle Mission Control the change of shif briefing with flight director Neil Hutchingson will occur 25 minutes from now at 9:00 central standard time in the NASA news center, building 2, room 135.

PAO This is Shuttle Mission Control we are 4 minutes away from acquisition of signal through the ground station at Santiago, Chile. The change of shift briefing with flight director Neil Hutchingson will occur in 20 minutes at 9:15 p.m. central standard time in the NASA news center, building 2, room 135 at Johnson Space Center Houston. Flight Director Neil Hutchingson will be accompied by Doctor Sam Pool who is chief of the medical science division at the Johnson Space Center. Doctor Pool has been flight surgeon on the silver team for this shift. Mission elasped time is one day 10 hours 55 minutes 46 seconds. This is Shuttle Mission Control.

PAO This is Mission Control Houston. We are one minute away from acquisition of signal over Santiago, Chile. Change of shift has occured hand over between Neil Hutchingson's orbit team and the ascent team under flight director Tommy Holloway, has assumed position at the consoles. Capsule communicator is for this team are primary communicator is Terry Hart, and backup communicator is David Griggs. The upcoming pass at Santiago will be our first look at the payload bay door data which is the prominent issue concerning the flight control team at this juncture. The crew is about one hour over due for its sleep period the plan is to get them to bed in approximately an hour.

END OF TAPE

SPACECRAFT ...using a starline to do a number 2 and 31. Is that right?

CAPCOM That's affirmative and the reason for that, we're seeing a quarter of a degree error in IMU Number 2 and we think the IMU to IMU align will take care of it.

SPACECRAFT Okay, and we just now reached the top sun attitude and we'll start our 15 minutes from now. Is that okay?

CAPCOM Roger. We see that and we concur.

SPACECRAFT Here is our PGU Ops Sally. Our temperatures are one to two tenths lower than they were the last time and the lights are all proper.

CAPCOM Roger. We copy that. We've got one minute left in this pass. We sent you three teleprinter messages for information. One of them is an overview of our RMS plans for tomorrow and you might want to go down and take a look at that if you get a chance this evening. The other two are entry weather and a TIMBU summary.

SPACECRAFT Okay, we'll have a look.

CAPCOM Okay, and we hope you're getting a chance to eat through all of this.

SPACECRAFT And did you give us an attitude to go to for PTC?

CAPCOM Jack, just go to PTC and start the roll after the 15 minutes, and we're 10 seconds to LOS. I'm sorry, you're at the PTC attitude now so you can just initate the rotation and we'll talk to you at Hawaii at 10:34.

SPACECRAFT Okay. So this is it?

PAO This is Shuttle Control. Indian Ocean Station has lost signal with Columbia. Next acquisiton is Hawaii in 30 minutes. We informed the crew during this pass that there is no concern for safety because of the tile loss. Also, we told them that bondline temperatures during this long tail to sun attitude have been running 30 to 50 degrees higher than we anticipated. Columbia reached top sun attitude just prior to LOS at the Indian Ocean Station, but data showed temperatures starting to rise even before Columbia reached its full top sun attitude. Columbia will stay in the top sun attitude for 15 minutes, then go to passive thermal control rolling, and at that time perform the door test closing and latching the port door, and then unlatching and opening that door again. We're 29 minutes away from Hawaii now at 1 day, 10 hours, 5 minutes mission elapsed time. This is Shuttle Control Houston.

PAO This is Shuttle Control with a reminder that the change of shift briefing originally scheduled for 8:30 p.m. Central Standard Time has been delayed. Time for that briefing will be announced as soon as it is known. This is Shuttle Control at 1 day, 10 hours, 32 minutes mission elapsed time. Columbia is about 1 minute away from acquisition through Hawaii. We should get some information at this station on the recycling of the port payload bay door. This is Shuttle Control. Data shows that both doors are open and temperatures are starting to rise. All the flight controllers are looking at data concerning their systems and all are satisfied with what they see they tell Flight Director Neal Hutchinson. The first part of this Hawaii pass is devoted to the private medical communication. We'll get voice with the crew following that. We'll stand by.

CAPCOM Columbia with 2 minutes left in this pass, we're eager to hear the results of the door test.

SPACECRAFT Okay. I understand you want to go ahead with the door test.

CAPCOM We were hoping for results of your payload bay door closing.

SPACECRAFT Oh oh, we haven't gotten around to it Sally. I'm sorry, I just wasn't thinking.

CAPCOM Okay. We copy and we'd like you to terminate the water dump at this time please.

SPACECRAFT (garble)

END OF TAPE

CAPCOM Ok, thank you and we've got 50 seconds left, we'll talk to you at Indian Ocean in 3 minutes.

SPACECRAFT Ok.

PAO This is shuttle control, Columbia is out of range at Bottswana now. Next station, the Indian Ocean station in about 2 minutes. Capcom Sally Ride gave the crew a configuration for the communication system tonight to record the interference that Jack Lousma heard last night in an attempt to find its source. Columbia now being maneuvered to top sun attitude. We're 20 seconds away from sunrise on this orbit and Columbia will be at top sun attitude at sunrise. Crew is 2 hours and 5 minutes away from beginning its sleep period tonight. IOS acquisition in 1 minute, we'll stand by for conversations with Columbia there. At 1 day 9 hours 55 minutes this is shuttle control Houston.

CAPCOM Columbia Houston with you through Indian Ocean for 6 minutes over.

SPACECRAFT Ok, Sally, loud and clear.

CAPCOM Your loud and clear also Gordo and I have a couple of summary notes here. A summary of your thermal status during the day and also an assessment of the tile damage that we saw.

SPACECRAFT Ok, go ahead.

CAPCOM Ok, first of all as far as the tile goes, we think there is no concern because of the tiles that are missing. We've made an assessment using previous flight data and we think that the maximum structural temperatures aren't high enough to compromise the strength integrity of the orbiter structure.

SPACECRAFT Ok, if you find out otherwise, I don't think we want to know.

CAPCOM Roger, that. As far as the thermal status goes the tail sun DTO, as we told you earlier preliminary analysis looks like the attitude excursions during the PRCS interactions test did not affect the tail sun DTO, those were no problem. Also a point of interest is that the overall vehicle temperatures didn't respond quite as quickly as the analysis had predicted they would. In fact the bond lines are about 30 to 70 degrees Fehrenheit higher than we expected. Also you probably noticed that the circ pumps are cycling, there cycling in the temperature mode and they look like they're working good. The duty cycles are pretty low, they're about 5 percent duty cycles. And we're going we're going to be coming out of tail sun a little bit early to get the payload bay doors closed. But, we

don't think that that's going to disturb the tail sun DTO and it shouldn't affect the thermal recovery signature that we're looking for.

SPACECRAFT Alright.

CAPCOM And we would like to make sure that that switch configuration for presleep com that I read up the last pass, I'd like to make sure that you know not to make that switch configuration change now but to wait till just before sleep.

SPACECRAFT Ok, we'll wait on that Sally, thank you.

CAPCOM Ok, and also Gordo, we do have some bad news a little bit embarrasing. We made a mistake down here we were not recording voice after the Buckhorn pass, so we got the information you put on the recorder between Hawaii and Buckhorn but we did not get anything after Buckhorn and we don't think that's important for us to get it tonight and we can talk to you about that later.

SPACECRAFT All that lecture for nothing!

CAPCOM Sorry about that, but we will be recording voice from now on this evening through the door test.

SPACECRAFT Ok, as long as we have that switch on.

CAPCOM Roger. Columbia Houston IMU alignment plan, we'd like you to align, to do an IMU to IMU alignment and we'd like you align IMU's 2 and 3 to number 1.

SPACECRAFT Ok, rather than using a start line, do a 2 and 3 to 1, is that right.

CAPCOM That's firmative and the reason for that we're seeing a quarter of degree error in IMU number 2 and we think the IMU to IMU align will take care of it.

SPACECRAFT Ok, and we now just now reached the top sun attitude and we'll start a 15 minutes from now is that ok?

CAPCOM Roger, we see that and we concur.

end of tape

PAO This is Shuttle Control at one day 9 hours 47 minutes, mission elasped time. We're about thirty seconds away from acquisition throught Botswana. Voice only at this station, no telemetry data.

CAPCOM Columbia Houston through Botswana for six and a half minutes. How do you read?

CAPCOM Columbia Houston through Botswana over.

SPACECRAFT Okay we're reading you through Botswana. I guess its closer now. Can your hear?

CAPCOM That's affirmative Jack. You're loud and clear and we've got you for six minutes.

SPACECRAFT Okay did you want us to come out of (garble).

CAPCOM Say again Jack. You broke up there.

SPACECRAFT Okay did you want us to be in top sun when we come out of darkness or you want us to wait until we start the maneuver.

CAPCOM Jack you can start that maneuver anytime.

SPACECRAFT Okay and you told me I need to make an IMU alignment just like its in the book, right. Stars on 57 and 55.

CAPCOM Negative Jack. I sorry the stars in the table were good and we'll need to get a look at those stars over in the Indian Ocean. If those stars are still good then the alignment will not be required.

SPACECRAFT I thinking you want an IMU alignment but it won't be necessary to get the new stars, the ones in the tables are okay.

CAPCOM Jack we'll be gettin data over the Indian Ocean in about 7 minutes and we'll take a look at it then and let you know.

SPACECRAFT Okay. We'll do a (garble) right now.

CAPCOM Roger we concur. And Jack I've got a note for you on your calm sleep configuration if you're ready to copy.

SPACECRAFT Okay go ahead.

CAPCOM Roger. This is in attempt to determine the source of interference that you are experencing last night and the

switch changes are going to allow us to record some of the RF interference, the UHF as well as the S-band that we record anyway. What we would like you to do is have you select UHF that's air to air instead of ICOM A. And you can do that by selecting on panel A1, voice recording select channel 2 to air to air.

SPACECRAFT Okay. That's to air to air.

CAPCOM Okay and again that will enable us to record the UHF as well as the S-band and try to track that down. And post sleep we're going to need you to go back voice recording select channel 2 to ICOM A. And we'll remind you about that.

SPACECRAFT Okay that's fine although I noticed last night that beside from a few very week UHF transmissions that I wasn't able to get rid of the noise by turning the UHF off. And it sounded like, when somebody's tracking you with radar and it seemed like it got into us without going through UHF.

CAPCOM We understand that Jack and we're trying to record it.

SPACECRAFT Okay good news.

CAPCOM And Jack if you choose to do this, you're free to go ahead and sleep on the speaker box upstairs rather than on the HIU but if you elect to do that we would like to know that.

SPACECRAFT Okay we probably ought to have you give us for sure thing a configuration for that.

CAPCOM Okay we'll do that. And Jack we'd like to verify one more time, did you try turing off the S-band air to ground one when you had a problem with noise.

SPACECRAFT That's affirm. I turned off air to ground one and I turned off air to air (garble).

CAPCOM Okay thank you and we got 50 seconds left. We'll talk to you again at Indian Ocean in 3 minutes.

END OF TAPE

SPACECRAFT (garble)

CAPCOM Okay. The top sun attitude; we'd like you to use DAP B for the maneuver. If you input a body vector of 3, that's in item 8, and the target Id of 4, that's in item 14, and use the track option, that should get you the top sun; and again we'd like you to stasLthere for 15 minutes. After that 15 minutes, if you DAP alpha 2 to get to PTC at the body vector of 1 and once you get there you can just initiate the rotation. That'll be PTC. And sunrise occurs just about the beginning of the next Indian Ocean pass, which is at 9:56.

SPACECRAFT The next sunrise, you want to go to top sun with,..and we know how to do that. Stay there for 15 minutes and then initate PTC and after we get that going, close and latch the port door and then reopen it.

CAPCOM That's affirmative. And just to remind you, you'll need to stow the radiators first.

SPACECRAFT Okay, and if the latches hang up again like they did the first time, do you want to still go ahead and reopen it?

CAPCOM That's affirmative.

SPACECRAFT Okay, and I guess I'll go ahead and dictate the rest of the numbers hereafter LOS.

CAPCOM Okay. That'll be good. We've got about 1 minute left in this pass and we'll be able to dump it a little bit later on and that data hopefully we can sort out the problem.

SPACECRAFT The initial talking on this lecture of mine started at 09:04, Sally.

CAPCOM Thank you. That'll help us. And Columbia Houston with 45 seconds left, looking at your star table, it looks like stars 36 and 12 are good stars. You can use those to do an alignment and the IMU alignment maneuver won't be required later on.

SPACECRAFT Okay. Good deal.

CAPCOM And we owe you a number on the water dump. We'd like you to dump tank BRAVO to 10% and that should be a water dump scheduled for this evening. Again, that's tank BRAVO to 10%.

SPACECRAFT Okay. We got that, BRAVO to 10.

CAPCOM And we'll talk to you at Botswana at 09:47.

PAO This is Shuttle Control. Buckhorn has loss of signal. We've informed the crew during this pass that at next sunrise, which is schedule for 1 day, 9 hours, 56 minutes, we want them to go to a top sun attitude for 15 minutes, then go into passive thermal control. That's...spacecraft rolls twice every hour in passive thermal control. Then close and latch the port door, then reopen the door. We plan to stay in passive thermal control attitude all night during the sleep period. Sunrise begins on this orbit just before acquisition at the Indian Ocean station. Next acquisition is through Botswana in 34-1/2 minutes. Botswana is a UHF station only and we'll have no telemetry data there, voice only. At 1 day, 9 hours, 13 minutes mission elapsed time, this is Shuttle Control Houston.

PAO This is Shuttle Control. The next change of shift briefing presently scheduled for 8:30 will not be conducted at that time. We do not have an estimated for the briefing yet. We will come up and give you that time as soon as it's available, but the change of shift briefing will be delayed. It will not occur at 8:30 p.m. Central Standard Time. Columbia now down over South America. We're 14-1/2 minutes away from acquisition through Botswana. 1 day, 9 hours, 33 minutes mission elapsed time. This is Shuttle Control Houston.

PAO This is Shuttle Control at 1 day, 9 hours, 47 minutes mission elapsed time. We're about 30 seconds away from acquisiton through Botswana. Voice only at this station, no...

END OF TAPE

PAO We're getting into the orbits now where there's very little contact with tracking stations around the world. But we'll stand by for Hawaii in 42 minutes to get a further information on the door latch situation. At 1 day 8 hours 19 minutes, mission elapsed time, this is shuttle control Houston.

CAPCOM Columbia, Houston, short Hawaii pass and I got a quick message for you if you read.

SPACECRAFT Ok, say it Sally.

CAPCOM Roger, Gordo, the air to ground time is short tonight, we'd like to get the fuel to light data and if you could read it on the between now and the stateside pass, we'll dump it stateside and we'd like to get a door status.

SPACECRAFT Ok, we got the doors open the radiator deployed and we back in cut a little bit off, the latest funny was port door came up with a dilema instead of an op and the port forward latches show ready to latch even though the door is ready to open.

CAPCOM Roger, we copy that Gordo.

SPACECRAFT I tell you what, I'll put our lights on all the numbers on exact sequence of steps on the beginning of this whole thing so maybe you can get is sorted out.

CAPCOM That will help us a lot, we've got 50 seconds left in this pass. Gordo, with 30 seconds left, what we're thinking right now is that the problem may have been with frozen up either laungeron or aft bulkheads seals and that 15 minutes worth of top sun may fix that and we're looking at that in maybe oh half a rev or so and we'll talk to you stateside in 3 minutes.

SPACECRAFT Ok, I don't know how these radio switches figure into them but we'll see you then.

CAPCOM Roger, we'll look at that stateside.

PAO This is shuttle control, Hawaii has loss of signal at somewhat early LOS. Next station is Buckhorn in 4 minutes. Crew reported that the door is open, doors and latches, that is but pilot Fullerton reported another funny. The port forward latch shows ready to latch on the indication even though the doors are open. Maybe some thought that this may be connected to the thermal conditions and we're considering some top sun, top sun attitude for 15 minutes later on in this orbit. We'll talk about that to the crew later. We're about 3 minutes away from Buckhorn. At the low elevation of pass at Buckhorn just under a 4 minute pass. One day 9 hours four minutes mission elapsed time, this is shuttle control Houston.

PAO This is shuttle control at 1 day 9 hours 7 minutes mission elapsed time. Columbia about 20 seconds away from acquisition through Buckhorn.

CAPCOM Columbia Houston with you through Buckhorn for 4 minutes and we'd like to know if you've got the lights on the icom, if so we'll dump it.

SPACECRAFT Well I've some of them, but not all.

CAPCOM Ok, we'll hold up on the dump, and I've got a general plan if you're ready to copy.

SPACECRAFT go ahead.

CAPCOM Ok, at the next sunrise which ought to be at our next Indian Ocean pass we'd like you to go top sun, and I've got an attitude for that in a minute. We plan to stay in top sun for 15 minutes, we think that ought to solve the thermal problem. Then we'd like you to initiate, to go to PTC. Initiate the rotation and we intend to spend the night in PTC. Once you get the PTC started we'd like you to close and latch the port door just to verify that it will close and latch and we'd like you to reopen it and that ought to satisfy us that everything is fine, and I got the details of the top sun attitude and the PTC attitude if you've got a pencil.

SPACECRAFT go ahead.

CAPCOM Ok, the top sun attitude we'd like you to use dap B for the maneuver. If you input a body vector of 3, that's item 8 and the target id of 4 that's item 14 and use the track option

end of tape.

CAPCOM Indication is that the port aft bulkhead latch is hung up. Neither closed nor open. This occurred during the cycle test. We have asked Pilot Fullerton to take some (garble) auto light readings and then attempt to free these latches. We'll talk to him again. This is a lengthy procedure and we should have some information on that at Botswana. At 1 day, 7 hours, 41 minutes, this is Shuttle Control Houston.

CAPCOM This is Shuttle Control at 1 day, 8 hours, 13 minutes mission elapsed time. Columbia is approaching the tracking station at Botswana. This will be about a 3 minute pass and we will get additional information on the payload bay door latch situation. Should have acquisition in about 20 seconds or so.

CAPCOM Columbia Houston through Botswana. How do you read?

SPACECRAFT (garble).

CAPCOM Okay Jack. You're very weak. We've got the squelch turned all the way up and if you could give us a radio check we can set it.

SPACECRAFT Okay. Gordo is opening the right door. Is that what you want him to do is to continue to open the latch also?

CAPCOM That's affirmative if you can and that's if you've finished with the measurements.

SPACECRAFT How do you read the Columbia?

CAPCOM You're coming in very weak.

SPACECRAFT Okay, we got the right hand door open, do you want us to open the left door now?

CAPCOM That's affirmative.

SPACECRAFT We will open the left door and all the latches.

CAPCOM That's affirmative. We concur.

CAPCOM Columbia Houston with 1 minute left in this pass. Can you give us a summary of the overlap that you saw.

SPACECRAFT (garble)

CAPCOM Columbia Houston, we're 30 seconds to LOS. We were unable to copy your last. We'll talk to you next at Hawaii in 44 minutes.

CAPCOM Roger.

PARAGRAPH P NOT FOUND

PAO This is Shuttle Control. Columbia is beyond the range of Botswana. Very unsatisfactory communications this time at Botswana. A very low elevation pass and Botswana is an ultra-high frequency station only so we had no telemetry data from that station. We did understand from Jack Lausma that Gordon Fullerton had opened the right door and was preparing to start opening the left door and all of the hatches, ah, the latches on the left side. Next station is Hawaii in 43 minutes. That is an (garble) elevation pass. Duration of the pass will be about 1 minute, slightly over 1 minute. We're getting into the orbits now where there is (garble) contact with tracking stations around the world but we'll stand by for Hawaii in 42 minutes to get a (garble)...

END OF TAPE

PAO Also Fullerton is involved with cycling the payload bay doors. The test after, we're approaching 24 hours tail sun and the crew activity plan calls for cycling the doors, that's what he's doing at this time. Columbia's on orbit 22. At 1 day, 7 hours, 17 minutes mission elapsed time. This is Shuttle Control Houston.

PAO This is Shuttle Control at 1 day, 7 hours, 32 minutes mission elapsed time. We're about 20 seconds away from acquisition through through Buckhorn on orbit number 22.

CAPCOM Columbia Houston through the states for 6-1/2 minutes.

SPACECRAFT Okay Sally. Got you loud and clear. I drove that motor about a minute and 20 seconds or so and I still have no closes and both opens are (garble)

CAPCOM Roger Gordo. We saw that data real time and our question now is whether you managed to get any theodolite measurements. Other than group A?

SPACECRAFT I sure did.

CAPCOM Okay. What we would like you to do, get the theodolite measurements of the centerline and on the port Longeron.

SPACECRAFT Okay and I'm looking down the line and it sure looks like its down flush and closed.

CAPCOM Roger.

SPACECRAFT These are not easy to do and won't be done in the next 6 minutes, I can guarantee you that.

CAPCOM We understand that. And Gordo, our plan here is we would like you to take the theodolite measurements of the centerline and the port laungeron just to capture the condition that got us in trouble here. And after you have done that we would like to have you try and back off the AFT bulkhead latches driving single motor time.

SPACECRAFT Okay. I take the measurements back off for 1 minute and then what?

CAPCOM Stand by. And Gordo, while we're thinking about that, I've got some circuit breakers on MA73 Charlie row Charlie that Jack could be checking.

SPACECRAFT (garble)

CAPCOM Roger. Understand. Columbia Houston, what we'd like you to do after you take this theodolite measurements with the port door in the configuration that its in now is to bring the starboard door to nearly closed do an extended guide roller check and get theodolite measurements there and then try to back off the AFT bulkhead latches.

SPACECRAFT You want me to take these readings and close the starboard door, get the guide roller check, and take the light readings and then try and back off the port bulkhead latches.

CAPCOM That's affirmative. That first opening, the starboard door backup and then try and back off the AFT bulkhead port latches.

SPACECRAFT You want the starboard door back open. Okay?

CAPCOM That's correct. And Columbia, with one minute left in this pass, a piece of information for you. We had the data when you started driving. It looked to us like one motor went off early and we saw a stall motor early, so you may be operating on single motor.

SPACECRAFT Okay.

CAPCOM And Gordo, if you got some VTR tapes and time to do that we would like to get VTR of the door, the door and the configuration that you got it now before you try backing off the latches and while you're doing that.

SPACECRAFT Okay.

CAPCOM And we're 15 seconds to LOS, Botswana is next at 8 plus 14 in 34 minutes.

SPACECRAFT Okay.

PAO This is Shuttle Control. Buckhorn has loss of signal. That's the only state side station Columbia sees during this orbit. Next station is Botswana in 33 and 1/2 minutes. Indication is that the port AFT bulkhead latch is hung up. Neither closed or open. This occurred during the cycle test.

END OF TAPE

CAPCOM Columbia, Houston in the blind with 40 seconds left in this pass we'll talk to you at Guam at 7:10 that's 28 minutes from now.

PAO This is Shuttle Control, Columbia is out of range at Botswana now. Very low elevation pass at this station this time, Comm was not successful. Columbia misses the Australian stations on this revolution. The next station is Guam in 27 and a half minutes. At one day 6 hours 42 minutes mission elapsed time this is Shuttle Control Houston.

PAO This is Shuttle Control with another reminder about the briefing scheduled at 5 p.m. the topic will be orbital thermal protection tiles, the briefer will be Tom Mosier deputy manager of the orbiter project office. That's at 5 p.m. Central Standard Time in room 135 at the JSC newscenter, Building 2.

PAO This is Shuttle Control at 1 day 6 hours 51 minutes mission elapsed time. There's conference going on at the Flight Directors counsel at the present time concerning procedures for grappling and deploying the plasma diagnostic package tomorrow. Astronaut Hank Hartsfield has been running procedures in the simulator. He's in this conference, they would like to come up with proper procedures and the plan is to send those procedures on the teleprinter up to Columbia before the crew goes to sleep tonight so that Lousma and Fullerton will have an opportunity to review them and comment on them. We're about 17 and a half minutes away from the next station which is Guam, at 1 day 6 hours 52 minutes mission elapsed time this is Shuttle Control Houston.

PAO This is Shuttle Control Houston at 1 day 7 hours 9 minutes misssion elapsed time about 20 seconds away from acquisition through Guam.

CAPCOM Columbia, Houston through Guam for six and a half minutes.

SPACECRAFT Okay Sally, I'm starting reading two.

SPACECRAFT This is Columbia, I didn't get any answer, did you hear me?

CAPCOM That is affirmative Gordo, we're watching you.

SPACECRAFT Okay, I got group A done.

CAPCOM Roger, we copy, you finished group A.

SPACECRAFT And Sally we just finished freezing and stalling the first electrophoresis sample and the one that is supposed to reach some readings to you.

CAPCOM Roger Jack, stowing sample one.

SPACECRAFT Ready to copy down the data I'm supposed to ship to you immediately?

CAPCOM Go ahead, we are ready to copy.

SPACECRAFT Ok, call number one was the red blood cell. the red blood cell that ten minutes was zero, after 20 minutes was 28 millimimeters, after the 30 minutes was 42 millimiters, after 40 minutes was 51 millimiters, after 50 minutes was 62 millimiters. And I also took a look after 1 full hour and that was 70 millimeters, over.

CAPCOM Jack, we copy all that, thank you. Columbia, we'd like to make some variable paramater down list changes could you give us spec one to a GNC machine please.

SPACECRAFT yes just a minute, ok, you got it.

CAPCOM Thank you, we see it and Columbia, Jack we have one more question on EEBT sample number one. We're wonder if you saw 2 bands of red blood cells and if so whether if you could tell us the distance between those two bands as they migrated.

SPACECRAFT No I didn't see two bands. The whole blood cell population seems to move in one group although it looks like when they got to the very top after a minute, after one hour millimeters there was some clear at the bottom, so I think the bottom was around 30 millimeters but I'm not sure I'll have to take a look at the pictures.

CAPCOM Roger, thanks a lot Jack that'll help us.

SPACECRAFT Ok. Sally is anybody watching the read.

CAPCOM That's affirmative, we are watching the latched discreets.

SPACECRAFT On the port aft latches didn't go close.

CAPCOM Roger, we're looking at that. And Columbia, we're finished with the CRT.

SPACECRAFT Ok.

CAPCOM Columbia with 20 seconds we're looking at the latch problem we'd like you to hold the door right where it is and we'll talk to you stateside in 15 minutes.

SPACECRAFT Ok.

PAO This is shuttle control, Columbia is out of range at Guam, next station is Buckhorn in 15 and a half minutes. Got a further report on the electrophoresis experiment, during this pass, also Fullerton is involved with the cycling payload bay doors test after approaching 24 hours tail sun

end of tape.

CAPCOM Columbia Houston through Ascension for a short 2 minute pass.

SPACECRAFT Hello Houston. We're still electrophoresising.

CAPCOM Roger, Jack, and one reminder in preparation for the payload bay door test, don't forget to take the high load duct heater to bravo.

SPACECRAFT Okay, I don't know Gordon may have gotten that already. I got it, Sally, 20 after the hour and it triggered a message. I assume it's just because it was when it's cold when I turned the heater on.

CAPCOM Roger, and that should be heater alpha. And Columbia, word of warning, we see that you've got all the CRT's on your SM machine.

SPACECRAFT Oops, thank you for watching over me.

CAPCOM We wanted to catch that before sin soup did. And with 50 seconds left we're thinking about the sleep configuration for tonight. We've got a couple of questions on the comm. First we'd like to know where you turned off air to ground 1?

SPACECRAFT What did you say about air to ground 1?

CAPCOM We'd like to know how you turned it off presleep last night.

SPACECRAFT I don't think we did. Turned air to air UHF off at the on the overhead panel after transmitting.

CAPCOM Okay, we copy that and understand you did not turn off air to ground 1 during the night.

SPACECRAFT That's affirm. Didn't turn it off nor did I turn off the UHF except for very short periods but even after I turned it off I still had some kind of noise coming over the headset.

CAPCOM Understand

SPACECRAFT When I was at the higher latitudes going over south of Soviet Union.

CAPCOM Understand and was Gordo bothered by that down on the mid deck?

SPACECRAFT No it was very weak down there because I did not have a headset on. I had the turned full off (garble)

CAPCOM Understand, we're going LOS and we'll talk to you next at Botswana at 640.

PAO This is Shuttle Control. Columbia's out of range at Ascension now. Botswana next for a very short pass in about 7 and 1/2 minutes. Attempting to get some information on the configuration of the communications aboard Columbia presleep last night. Jack Lousma was bothered by some noise in the headset and the communications experts are trying to come up with the reconfiguration so that it won't happen again tonight. Crew about 5 and 1/2 hours away from their sleep period. At 1 day 6 hours 32 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control. A briefing on thermal protection system tiles is scheduled at 5:00 p.m. in Room 135 in Building 2 of the JSC News Center. Briefer will be Tom Moser, Deputy Manager Orbiter Project Office. This is Shuttle Control at 1 day 6 hours 39 minutes mission elapsed time standing by for acquisition through Botswana.

CAPCOM Columbia Houston through Botswana, how do you read? Columbia Houston through Botswana for 2 minutes, over. Columbia Houston through Botswana. Columbia Houston in the blind with 40 seconds left in this pass. We'll talk to you at Guam at 1110, that's 28 minutes from now.

END OF TAPE

SPACECRAFT ...we've been watching them constant. Every time the sun is lighting them you see them all the way through.

CAPCOM Those are real good pictures we're getting a clear shot of that.

SPACECRAFT Okay. You can see big ones and little ones and middle size. And every now and then you'll notice a sort of impulse where they spread out a little faster. A couple of ice chunks rotating there.

SPACECRAFT ...halfway up the fin on the right side, is a little blob that happens to be the moon. Just a crescent moon out now and it blurs on the TV and looks like a little blob.

SPACECRAFT If I had to guess the origin. It sure looks like they're coming from main engine area.

CAPCOM Roger Gordo. That is what it looks like.

SPACECRAFT Back on the D camera, the color camera, does that cope with it at all or does it work and give you a good picture Sally.

CAPCOM Yeah Gordo. The picture from the Delta camera is coming in real well also. Both cameras gave us excellent pictures.

SPACECRAFT Were leaving a good trail so we can find the way home.

CAPCOM We were wondering how you would navigate.

SPACECRAFT Fourth of July.

CAPCOM It really does.

CAPCOM Columbia we're 50 seconds to LOS this has been a super show we really appreciate you getting this on tape and playing it for us and playing it back.

SPACECRAFT It is true, it's still happening, I'll quickly shift you over to live tv here and see if it has the same effect.

CAPCOM Okay we've got 30 seconds.

SPACECRAFT Anything for showbiz, Sally.

CAPCOM Looks like you made it.

SPACECRAFT Okay I have the D camera on now, on downlink your looking at a picture of the same thing.

CAPCOM We're seeing it. and going LOS, Ascension is next in 14 minutes.

SPACECRAFT Okay.

PAO This is Shuttle Control, Merritt Island has loss of signal, we had video tape recording at that very end there some live television of the particles of the that had been emitting from the aft section of the Orbiter at the first of this pass at Goldstone had televison of Jack Lousma performing the electrophoresis experiment. At 5 p.m today in room 135 at the JSC newscenter there will be a briefing on the orbiter thermal protection tiles by Tom Mosier deputy manager of the Space Shuttle Orbiter Project Office, to repeat at 5 p.m. today in room 135 that's the briefing room in the JSC newscenter there will be a briefing on thermal protection system tiles by Tom Moser, deputy manager of the Space Shuttle Orbiter Project Office. The next station to see Columbia will be Ascension Island in 13 minutes. At 1 day 6 hours 16 minutes mission elapsed time this is Shuttle Control Houston.

PAO This is Shuttle Control at 1 day 6 hours 28 minutes mission elapsed time, Columbia coming up on acquistion through Ascension Island.

CAPCOM Columbia, Houston through Ascension for a short two minute pass.

SPACECRAFT Hello there Houston. We're still electrophoresing.

CAPCOM Roger Jack, and one reminder in preparation ..

END OF TAPE

SPACECRAFT It's time for you now to take the top off and to examine the contents and see how this migration has taken place. Maybe I can show it to you on television.

SPACECRAFT Now, perhaps this is difficult to see for you, but it shows me right here that over a period of about 30 minutes these red blood cells have migrated already in 40 centimeters, correction 40 millimeters up this column and in another 30 minutes this migration will be complete and will then be frozen so it can be analyzed for it's contents when it gets back to earth. And as I said this is just an example of one ..... pharmaceutical agent that can be used in the combatting disease which is very difficult to manufacture on the ground and very expensive... very small quantities, but this particular experiment is going to show us I believe we can manufacture very large quantities at a much lower cost and thereby be able to combat some of the diseases more effectively on the ground than we are able to do at this present time. So, we're glad to have you with us today and we hope that you will keep following the flight of the Columbia as we go on to the next week.

SPACECRAFT Now comes the studio and TV technician down put in a (garbled) test. Sally.

CAPCOM Is that the vampire that goes with the red blood cells.

SPACECRAFT Something like that.

CAPCOM Jack that was a super summary and a great description. Said like a true scientist and we're getting real good pictures of you operating the EEVT.

SPACECRAFT Okay. Now I have to put the top back on this. It's actually migrated to 42 centimeters and it's only been 30 minutes and so you can see this is very effective and in 10 minutes more we'll take a look it again just to see how well it is doing. But, it obviously is working very well which is a very good piece of equipment. And it looks like it is going to bring us fair number of results. We have seven other samples to do of different kinds of pharmaceutical agents and then I think we'll be ready to build something and use something that's more productive and can be used on a larger scale. Of course you can do all kinds of neat stuff in 0g. I don't know how many of you people can stand a scissors on a piece of paper like we can here, but you see it's very simple.

SPACECRAFT Try that back on the ground.

CAPCOM I just tried it and.....

SPACECRAFT .....all this information on a card so that the

Principle investigator ..... will know what we did and he's also recording this with this camera. There are a number of settings which can be read off right here so he can follow the progress of this experiment as we do it.

CAPCOM And Jack we just lost TV out of Goldstone that was just a super description and we'll be picking up TV again out of Mila.

SPACECRAFT ....stop and switch over to the VTR.

CAPCOM That sounds like a good idea. We'll pick up the VTR when we acquire Mila.

CAPCOM Columbia, we're over White Sands again we'd like to get a radio check.

SPACECRAFT Okay loud and clear White Sands. Sally.

CAPCOM Your loud and clear also and our data looks good.

SPACECRAFT That's good.

CAPCOM And Gordo for information, we're running the S band at high power out of White Sands now and it's working real well this pass.

SPACECRAFT All right.

CAPCOM And Columbia we're over Mila now and we're ready for the VTR playback.

SPACECRAFT Okay I just started up the VTR and here you go ...you may have it. What I have here is a last bit of first bit of sunrise you can see the air glow on the horizon, and if you look right around the base of the vertical center, you'll be able to see the particles start to appear just as the sun comes up and either illuminate the particles or starts to heat them up so they fall off or both, I'm not sure which.

CAPCOM Okay Gordo we're getting a good picture now.

SPACECRAFT Here comes a spray of them now. You see on both sides of the tail there.

CAPCOM Yeah, we can see them.

SPACECRAFT We've been watching them constant. Every time the sun is lighting them you see them all the way through ....

CAPCOM Those are real good pictures we're getting a clear shot of that.

SPACECRAFT ...you can see big ones and little ones and middle size. But every now and then you'll notice...

END OF TAPE

CAPCOM Columbia, we're 30 seconds to Hawaii LOS. We'll talk to you stateside in 3 minutes.

SPACECRAFT Okay, Sally.

PAO This is Shuttle Control. Hawaii has loss of signal. Buckhorn next in 3 and 1/2 minutes and shortly after that we'll get TV from the Goldstone station in California. The plan now is to do the live television of the electrophoresis test at Goldstone acquisition and then we will dump the videotape recorder during the latter part of the pass over Mila. The videotape recorder contains the television of the particles. At 1 day 5 hours 55 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 1 day 5 hours 58 minutes mission elapsed time. We're about 10 seconds away from acquisition at Buckhorn.

CAPCOM Columbia Houston through Buckhorn.

SPACECRAFT Okay, Sally, got you loud and clear.

CAPCOM You're loud and clear also and we expect to acquire Goldstone in about 30 seconds. And Jack, we've got good TV now.

SPACECRAFT Houston, Columbia, are you ready for the TV cut.

CAPCOM That's affirmative. We're seeing Jack down on the mid deck now. And Jack, we see you talking but we can't hear you right now.

SPACECRAFT Okay, ladies and gentlemen, good evening and good afternoon space fans. We'd like to tell you what we're doing here in the Space Shuttle Columbia. We're sitting over the world at about 17,500 miles per hour. Now over the United States and we're doing some medical experiments among other things. This one I have right here, is called an electrophoresis experiment. It simply is a electrical wave to separate out various chemical agents that cannot be separated out very easily on the ground and it's a very expensive process. However, at 0 g these chemical agents can be separated out and used for various pharmaceautical and other medical purposes. This experiment is simply a forebearer of another more elaborate one which can produce more which will be on a future flight and is already has been funded very substantially by one of our U.S. pharmaceautical firms. Basically, what we have here is a tubing process (garble) (pause) that's inside of this container (pause) it was just like this and has a fluid inside which is actually a carrier for the agent which is being separated out. We have a sample that we use to (pause) place right in this slot in here and the sample is contained in a freezer. Inside this freezer are several small samples which are used in this

electrophoresis experiment and then once the experiment is processed and the various chemical agents are allowed to move (pause) along the tube and are separated out. When the process is completed in about an hour the whole sample is frozen and it is then taken and placed back in its cryo freezer for analysis back on the ground, but this is a forerunner of a pharmaceautical experiment. I think that this'll be one of the major experiments and one of the major industrial uses of space in the future and any other phamaceauticals and this is just a forerunner of one and it looks like it is working very well and we are having very promising results. I have to I have some red blood cells in this one at this particular time which are electrically migrating from one end to the other and separating out these agents and the sample is contained in this end right here. It's sampling out till you take the top off and to examine the contents and see how this migration is taking place and maybe I can show it to you on television. Now perhaps this is difficult to see for you but

END OF TAPE

CAPCOM (garble) we don't understand that either. We're checking into it.

CAPCOM Columbia, we're one minute to LOS. Guam is next in 8 minutes.

SPACECRAFT Okay.

PAO This is Shuttle Control. Columbia has moved out of range at Yarragadee. Misses Orroral on this pass. Next station will be Guam in 7 minutes. Jack Lousma reporting he's running the first electrophoresis test sample during this pass. At 1 day 5 hours 30 minutes Mission Elapsed Time this is Shuttle Control Houston.

CAPCOM Columbia, Houston through Guam.

SPACECRAFT loud and clear

CAPCOM Roger you're the same Gordo and we've got 4 minutes in this pass.

PAO This is Shuttle Control. Guam is in a keyhole now. Another 30 seconds before we'll have COMM reestablished.

SPACECRAFT Sally, I just cycled (garble) relay 5.

CAPCOM Roger.

CAPCOM Columbia, Houston. We're 50 seconds LOS. Hawaii is next at 5+50.

SPACECRAFT Okay.

SPACECRAFT see you later.

CAPCOM Say again Jack.

SPACECRAFT Roger, we'll see you later.

CAPCOM Okay.

PAO This is Shuttle Control. Columbia is out of range at Guam. Hawaii will pick up the spacecraft in about 8 minutes. At 1 day 5 hours 42 minutes Mission Elapsed Time, this is Shuttle Control Houston.

PAO This is Shuttle Control at 1 day 5 hours 49 minutes Mission Elapsed Time. We're about a minute away from normal acquisition through Hawaii, however, that station reports problems with their antenna and at this time they are unable to

support the pass. We'll standby in case they have the problem worked out. But we may not get acquisition at Hawaii.

CAPCOM Columbia, Houston through Hawaii.

SPACECRAFT Okay Sally read you loud and clear how me.

CAPCOM You're loud and clear Gordo.

SPACECRAFT Okay all set up. Jack is processing the red blood cells and is ready to go with that. I would suggest we do the live on the EEVT first and then whatever time is left we can run the VTRs kind of a lot of the same and so be hard to tell when to quit on it.

CAPCOM Okay we concur with that Gordo. Sounds like a good plan. And we'll be ready for it down here.

SPACECRAFT Okay.

SPACECRAFT We're not going to start this till Goldstone is that correct.

CAPCOM That affirmative. It'll be Goldstone.

SPACECRAFT Okay.

CAPCOM And Gordo we'll have TV through both Goldstone and Mila so there'll be a short break between Goldstone and Mila but we've basically got it all the way across the states.

SPACECRAFT Okay.

CAPCOM Columbia we are 30 seconds to Hawaii LOS. We'll talk to you stateside in 3 minutes.

SPACECRAFT Okay Sally.

END OF TAPE

PAO at 1 day 5 hours Mission Elapsed Time, this is Shuttle Control Houston.

PAO This is Shuttle Control at 1 day 5 hours 4 minutes. Columbia coming up on acquisition through Botswana.

CAPCOM Columbia, Houston through Botswana for 4 1/2 minutes. Over.

CAPCOM Columbia, Houston through Botswana for 4 minutes over.

CAPCOM Columbia, Houston through Botswana how do you read?

Botswana COMTEC, Houston COMTEC air to ground.

BOTSWANA Botswana

Okay you're loud and clear thank you.

BOTSWANA Thank you.

CAPCOM Columbia, Houston through Botswana how do you read.

SPACECRAFT Houston this is Columbia we got you loud and clear.

CAPCOM Okay Gordo we've got you loud and clear now also. There is 2 1/2 minutes left.

SPACECRAFT Okay about 3 minutes ago I got an S76 COMM and there was a camera overtemp (garble) that's a fact. None of the cameras were powered up however.

CAPCOM Roger Gordo and that may have been related to VTR. Can you tell us whether you were using the VTR at that time.

SPACECRAFT Yeah, I was using it.

SPACECRAFT (inaudible)

CAPCOM Gordo be advised your coming in very broken and unreadable. But, we copied that you were using the VTR we think that that's what caused the message and there is no cause to worry.

SPACECRAFT Okay.

CAPCOM Columbia we're one minute to LOS. Yarragadee is next at 5+23 and we want to make sure you understand that there is nothing critical about the live TV of the EEVT ops stateside. If you're not ready for that then that's no problem.

SPACECRAFT Okay we understand. Well I'm ready to go to ops right now. The only problem is it is 19 minutes before we get to you. Would you prefer for me to wait or do some other part of it.

CAPCOM Roger Jack. We'd like you to press on now. Don't wait for us.

PAO This is Shuttle Control. Columbia is out of range at Botswana. Next station Yarragadee in 13 minutes. Bad communications through Botswana which is a UHF station. At 1 day 5 hours 10 minutes, Mission Elapsed Time this is Shuttle Control Houston.

CAPCOM Columbia, Houston through Yarragadee for 7 minutes over.

SPACECRAFT Okay we're hearing you through Yarragadee and we got the first EEVT sample (garble). Going to go around here in a few minutes.

CAPCOM Roger Jack we copy that.

CAPCOM Columbia, Houston. If there's somebody up on the flight deck I've got a short payloads note.

SPACECRAFT Go ahead.

CAPCOM Roger we'd like you to switch tape recorder number one track select to four. And that's again for ground monitoring.

SPACECRAFT Okay ...reads delta.

CAPCOM Roger. Copy it's reading delta.

CAPCOM And Gordo, for information in case you'd been looking at the OMS RCS quantity gaging on spec 23, you might have noticed a funny reading. We've got a -3.95 percent bias in that gaging. We don't understand it. After you enabled the gaging it was counting up properly andthen it seemed to suddenly jump downward and was reading a negative number. It's counting again but it does have a bias in it of roughly 4 percent.

SPACECRAFT Okay. How could that happen.

CAPCOM We don't understand that either. We're checking into it.

END OF TAPE

CAPCOM ...looks like it is failed and there is no problem with that you can go ahead.

SPACECRAFT Okay.

SPACECRAFT And how about the heaters. You want to leave them at auto.

CAPCOM That's affirmative Gordo. We'd like the heaters left in auto.

SPACECRAFT I guess that about does it for the arm for today and I'll power down all this TV stuff too unless you see more use for it.

CAPCOM Okay we concur with that Gordo.

SPACECRAFT You going to try to get me to VTR that particle tape that I made for you.

CAPCOM That's affirmative. We're going to ask you to try and cue that up and play it back to us a little bit later on.

SPACECRAFT Okay I'll get that in the machine now and rewind it to the next spot.

CAPCOM Okay that's a good idea Gordo. In fact, what we're looking at is getting a playback next stateside pass which will be just about a hour from now.

SPACECRAFT Okay. I hope I didn't do something to mess it up but I switched back and forth between the color and black and white camera B and A just thought the color would enhance the picture or something. Does that goof you up as far as processing that data. I just started thinking of that.

CAPCOM No that shouldn't bother us at all.

SPACECRAFT Okay. I'll have it set up whenever you call.

CAPCOM And Gordo. What we're thinking about what we'd like to do is next stateside pass spend the first part of the pass getting this VTR playback of the particles that you just took and spend the rest of that pass getting live TV of some EEVT ops if that's possible.

SPACECRAFT Oh, okay. We'll have a look at that. I do have the cameras set up downstairs, but they haven't tuned it up or anything yet.

CAPCOM Okay and there is no problem with that. If you can't get that set up in time, we'll catch it later.

SPACECRAFT Sally you still there.

CAPCOM That's affirmative. We've got one more minute.

SPACECRAFT Okay the EEVT the sample number one is the red blood cells. Did you want that one first or want me to start with number two first and then do number one.

CAPCOM We'd like you to start with number one Jack.

SPACECRAFT Okay.

CAPCOM And Jack. Sample number one is the one that we'd like the observations on.

SPACECRAFT Okay you just want that those verbal observations or you want television.

CAPCOM We'd like your visual observations and if that's the one that you're working on when we get the TV we'd like to get that too. But the visual observations are the most important and those are the important data.

SPACECRAFT Okay and will the TV you want the VTR.

CAPCOM Standby. Jack we'd like to try and get that TV live next stateside pass. Otherwise VTR will be fine.

SPACECRAFT What time will that be.

CAPCOM Okay we're 15 seconds to LOS and Goldstone will be 6+00 that will be the live TV and our next pass is Botswana in 5 minutes.

SPACECRAFT Okay.

PAO This is Shuttle Control. Ascension has loss of signal. Next station is Botswana in just under 5 minutes. The remote manipulator system operations are concluded for today. Pilot Fullerton reports that he has the arm latched down. We're hoping on this next pass over the United States that will be on orbit 21 we're hoping to get a playback of the video tape recorder of the particles that are being emitted from the vehicle. Get that on the over the Goldstone Station at the first part of the pass and then if possible get live television for the remainder of the pass for the electrophoresis experiment. At 1 day 5 hours Mission Elapsed Time this is Shuttle Control Houston.

END OF TAPE

SPACECRAFT The lighting's in and out but he can probably see both inboard elevons are full up and the outboards are both?

CAPCOM Roger, we see that, and it looks like the reflections are not doing the cameras giving the cameras some trouble there. And Gordo, we've just lost TV, we're talking to you through Bermuda now, we're out of touch with Mila.

SPACECRAFT Okay.

CAPCOM And we appreciate all of that. I think that gave us a lot of good data.

SPACECRAFT I don't know if I'd call it good data.

CAPCOM Roger. And Jack, we think that in place of the suit donning that was scheduled for this afternoon, you might want to start EEVT sample 1 and then slip all the EED callouts for the rest of the afternoon by about 20 minutes.

SPACECRAFT Okay.

CAPCOM Okay, and that'll be samples 1 and 2 and sample 2 will probably slip into the exercise and you can go ahead and delete that if you like also to get sample 2 of the EEVT in.

SPACECRAFT Okay. Now you're looking for TV of one of these or 1.

CAPCOM We'd like either TV or observations of sample 1. If you're unable to set up the TV and time and get TV of the sample number 1 you will need to get the observation.

SPACECRAFT Okay.

CAPCOM Columbia Houston, we think that's going to be the end of the RMS activities for the afternoon and you can just go through the standard RMS powerdown, recradle it, latch it and stow it.

SPACECRAFT Okay, Sally.

CAPCOM Columbia, we're 50 seconds to LOS. Ascension's next at 4 plus 52.

SPACECRAFT Okay, we'll see you there.

CAPCOM Okay.

PAO This is Shuttle Control. Bermuda has loss of signal. Next station is Ascension Island in about 8 minutes. At a long series of television during the stateside pass inspecting

the tile. We also operated the 3 good television cameras in the payload bays briefly so that we could check the temperatures on them. Temperatures looked good. Crew will now go ahead with the electrophoresis testing step 2 of that experiment. Beginning with step 2. We may or may not have television of that operation, a decision on whether we will have we will televise that will come a little later. At 1 day 4 hours 44 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 1 day 4 hours 51 minutes mission elapsed time. Columbia's over the south Atlantic Ocean on it's 20th orbit. About 20 seconds away from acquisition through Ascension Island.

CAPCOM Columbia Houston through Ascension for 7 minutes, over.

SPACECRAFT Okay, Sally, I just latched it down, I haven't rolled it in yet though.

CAPCOM Okay, we'll watch you do that.

SPACECRAFT You're looking at the ready talkbacks of the microswitches?

CAPCOM Standby.

SPACECRAFT (garble) aft, ready one of those doesn't have a 1.

CAPCOM Roger, we see that, looks like it is failed and there's no problem with that, go ahead.

SPACECRAFT Oh. And how about the heaters, do you want to leave them in auto?

CAPCOM That's affirmative, Gordo, we'd like the heaters left in auto.

END OF TAPE

CAPCOM Roger we see those.

SPACECRAFT Starting to lose reasonable lighting here but, ...appear to be going on around the curve of the nose there and as we look out the front windshield it's quite evident in this view but the tile around the forward firing thruster seems kind of raggedy and uneven. Not at all smooth and there's a lot of steps and gaps there.

CAPCOM We'll take a look at that and the lighting still looks good to us. If you could maneuver the arm to get us a view of the other side of the nose, that would be helpful to us.

SPACECRAFT Okay. I'll try to do that.

SPACECRAFT I have to go through a couple of axis transformation here to get it over there Sally.

CAPCOM We understand that Gordo. Take your time we've got still 14 minutes left stateside.

SPACECRAFT I think that's about as far starboard as I can get with it Sally.

CAPCOM Okay Gordo that's a pretty good shot.

CAPCOM And Gordo we just lost TV at Goldstone we'll be acquiring Mila in about 2 or 3 minutes.

SPACECRAFT Okay.

CAPCOM And we'd like you to keep the arm and the camera right about where they are so that we can get that view again when we acquire Mila.

SPACECRAFT Okay.

CAPCOM The teleprinter message that you probably heard clacking away, was a message with some suggested settings and exposure times for taking 70 mm pictures of the debris that you've been seeing.

SPACECRAFT Oh, okay.

CAPCOM And Columbia, Houston. We're over the new White Sands station. We'd like a radio check.

SPACECRAFT (garble)

CAPCOM Roger you're loud and clear also.

CAPCOM And we've got TV back through Mila.

SPACECRAFT Okay.

SPACECRAFT ....hand most tile that seem to be missing in this picture we cannot see out the windshield so, (garble) seems to be quite a bunch of them there gone.

CAPCOM Roger we're looking at those.

SPACECRAFT (garble) we can probably do a 180 with the camera and look down on the wing starboard wing and maybe some of the side there if you wish.

CAPCOM Standby. Roger Gordo that sounds like a good idea. Why don't you try and pan down towards the wing.

SPACECRAFT Okay it's moving around.

CAPCOM Roger.

SPACECRAFT Looks like we can't get it quite down as far Sally.

CAPCOM Okay and you might want to watch to make sure the camera doesn't point at the sun.

SPACECRAFT A good point.

SPACECRAFT (garble) out over to the (garble) maybe I can see that way you know what I mean.

CAPCOM Okay.

CAPCOM And Columbia, we've got real good pictures of the nose. We're real happy with those and while your panning the camera around you might pause for a minute over the microfoil abrasion experiment so we can take a look at that. Columbia, just for information, we are from the ground here cycling through your camera to select different ones for downlink just so that we can read the temperatures on those cameras and make sure the heaters are working.

SPACECRAFT Okay.

CAPCOM And we're back on the elbow camera now.

SPACECRAFT Okay your looking at the canister and microfoil abrasion. Unfortunately we can't zoom in on that.

CAPCOM We see it now and it looks good.

SPACECRAFT The lighting is in and out but you can probably see both inboard elevons are swoll up and the outboards are (garble).

CAPCOM Roger we see that and it looks like the reflections are not doing the cameras giving the camera some trouble there.

END OF TAPE

SPACECRAFT (garble) now selected. Looks like at least the breakers are still in and the lights are red.

CAPCOM Okay that's a good sign and we're showing it showing it on down here.

SPACECRAFT That must be modern technique cause five minutes ago I did exactly the same thing in a breaker box.

CAPCOM Okay, well it seems to be working right now.

SPACECRAFT (garble)

CAPCOM Roger that. And Gordo, we'll be all set up for the live TV at the start of the states pass coming up. We've got TV scheduled over Goldstone and Mila both and we'd like to get as much of the scan on the live TV as we can cause we don't want to rely on having to dump the VTR. That costs quite a bit of FM time.

SPACECRAFT Okay, let me make sure what you want. I have some tape of the particles but you'd would rather you want to just do as much tile inspection as they can through this pass, is that right?

CAPCOM That's affirmative. We'd we want live scans of the nose area, both sides of the nose and the top of the nose, the tile inspection and we'd like you to be video taping that while you're showing it to us live.

SPACECRAFT Okay.

CAPCOM And if you can fit that on the same tape that you use to tape the particles that'd be easiest to us.

SPACECRAFT Uh, that didn't work out. I ran to the end of the tape on the particles. I'm going to have to get a new one.

CAPCOM Okay, that's no problem. We've got 1 minute left and we'll talk to you stateside in 4 minutes.

PAO This is Shuttle Control. Columbia's moved out of range at Hawaii. Next station coming up Buckhorn and Goldstone in 3 minutes. We'll have television there from the elbow camera on the remote arm. Start of this pass reported that the circuit breaker had popped again when Fullerton had tried to power up the elbow camera. However, we went back through the procedures we had used to check it out sometime ago and that camera is now up and operating so we expect to see a picture at Goldstone and an inspection of the tiles in the nose area of Columbia. About 2 minutes 20 seconds away from that now. This is Shuttle Control

at 1 day 4 hours 24 minutes. About 15 seconds away from acquisition on the west coast of the United States. We'll standby.

CAPCOM Columbia Houston, we're with you through Buckhorn stateside for 18 minutes, over.

SPACECRAFT Okay, Sally, have you got a picture?

CAPCOM Negative, we will have in when we acquire Goldstone in about 30 seconds and I'll let you know when we do that.

SPACECRAFT Okay.

CAPCOM And Gordo, we've got a picture now.

SPACECRAFT Okay, what we're doing there as far as this camera will zoom and you can see missing tile there.

CAPCOM Roger, Gordo, we've got a good picture of the missing tile. And Gordo, you can go ahead with whatever scan you think will give us the best pictures and a good view of the sides.

SPACECRAFT Okay, we're just feeling our way here since we just got the camera on we didn't have much practice at this but I see some little chunks of tile right at the base of the number 2 window there missing.

CAPCOM We see those also.

SPACECRAFT I think there's a few up just along side of the thrusters too in the very forward white area on the left side.

CAPCOM Roger, Jack, we're looking at those.

SPACECRAFT They're there in the center of the screen now in front of window 4 and there's a whole tile there gone and then pieces triangular corners of several tile fell out also.

CAPCOM Roger, we see those.

SPACECRAFT It's trying to lose a reasonable lighting here but they appear to be going on around the curve of the nose there and as we look out

END OF TAPE

SPACECRAFT that camera deal is a real bummer.

CAPCOM Sure is.

CAPCOM Columbia, Houston. We're working right now on some procedures and deltas to the procedures for you to go in and grapple the PDP tomorrow and do the loaded arm tests with the PDP in spite of the fact that we're missing a wrist camera. We think there will be a couple of changes to the procedures, but we're working on a teleprinter message and will try and have that up to you tonight so that you can look it over before the busy day tomorrow.

SPACECRAFT Okay that's good news. I think we can do it.

CAPCOM So do we.

CAPCOM Columbia, we're 20 seconds LOS Hawaii is next in 18 minutes.

SPACECRAFT Okay Sally. I've got the VTR on now. Trying to take a picture of sunrise and hopefully check some of the particles that happens if the moon is right over the tail also.

CAPCOM Okay that should give us some good pictures anyway. Thank you.

PAO This is Shuttle Control. Yarragadee has loss of signal. Next station is Hawaii in 18 minutes. At the end of that pass Gordon Fullerton reporting to CAPCOM Sally Ride that he had the video tape recorder set up and would try to get on tape some pictures of the particles. At sunrise, sunrise about a minute away for Columbia. Down over Australia. We also informed the crew during this pass that tonight we'll send them up some procedures for grappling the plasma diagnostic package with the remote arm. The wrist camera is out and new procedures for that operation are necessary. That's scheduled for tomorrow. That operation. Grappling and deployment of the PDP. At 1 day 3 hours 57 minutes Mission Elapsed Time this is Shuttle Control Houston.

PAO Hawaii has acquired Columbia at 1 day 4 hours 14 minutes.

CAPCOM Columbia, Houston through Hawaii for 6 1/2 minutes. Over.

SPACECRAFT Okay Sally. I'm clear. I've got some VTR on the particles. And they showed up pretty good on this monitor so you should have a good idea what we're talking about. However, when I went to power up the elbow camera, I first of all got no lights and went over and the breaker was popped. I guess we left it

CAPCOM the particles. We'd also like you to train the RMS elbow camera on the micro foil abrasion experiment that's on the top of the thermal canister and get a picture of that on the VTR also. We have some questions on that.

SPACECRAFT Okay.

CAPCOM Columbia, we're 1 minute to LOS. Botswana's next in 7 minutes.

SPACECRAFT Okay.

PAO This is Shuttle Control. Columbia's out of range of the Ascension Island staion now. Next is Botswana in 6 and 1/2 minutes. We told the crew during this pass that we'd like them to try to get some photographs and television of the particles on the video tape recorder if at all possible and they will attempt to do that. Jack Lousma reporting that the particles now seem to be coasting and drifting out the back at a random rate. Earlier he had reported that they had some velocity to them. At 1 day 3 hours 24 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 1 day 3 hours 30 minutes mission elapsed time standing by for acquisition through Botswana.

CAPCOM Columbia Houston through Botswana for 5 and 1/2 minutes, over.

SPACECRAFT Okay, Sally, and you?

CAPCOM Loud and clear also, Gordo.

SPACECRAFT I don't see anything back there looking for the SCIA people that we haven't discussed before. In general, it's that cloud of particles coming out the aft that's visible only when the earth is dark, the sky is black, but the Orbiter is still lighted so the sunlight reflects off these particles and really emphasizes them.

CAPCOM Roger, we understand and we'll pass that back to the payloads people. And Columbia, we assume that you're enjoying your lunch and Jack, we concur with postponing the suit donning and we'll work on rescheduling that for later on in the flight.

SPACECRAFT Okay, that doesn't mean you want us to be sitting around, maybe whatever's later on in the flight can be done now till we get it all done.

CAPCOM Roger, we're working on that now.

SPACECRAFT Okay, thank you.

CAPCOM about twenty after the hour

SPACECRAFT Okay, what's tell me what's of interest in that particular time period. Why did they pick that up?

CAPCOM We think that they're getting bright sky shutdown on the SIA and they'd like to get try and understand that. What they really want to know is whether there's any kind of illumination on the pallet. And that'd be lights, earth, the sun, or any reflections off the experiment.

SPACECRAFT I'll tell you what it might be is there's those particles we talked about before there's still lots of them coming out.

CAPCOM Roger and we'll talk to you at Dakar in 5.

PAO This is Shuttle Control. Bermuda has loss of signal. Next station is Dakar in 3 minutes. As we had just before loss of signal there Gordon Fullerton reported still seeing particles out the window. Crew getting ready for lunch. We're about 2 and 1/2 minutes away from Dakar, we'll standby for acquisition there. Mission elasped time is 1 day 3 hours 11 minutes. This Shuttle Control at 1 day 3 hours 13 minutes mission elapsed time. We're about 10 seconds away from Dakar.

CAPCOM Columbia Houston through Dakar in Ascension for 9 and 1/2 minutes.

SPACECRAFT Okay, Sally, we're hearing you. We're just looking at. We got one suggestion. If we could respectively suggest that we postpone this suit donning exercise to a different day I think that would be better for both of us and maybe we can pick up some of the other stuff today that we would have substituted for that.

CAPCOM Roger, Jack, we understand that you'd like to postpone the suit donning and we'll factor that in and get back to you.

SPACECRAFT Okay, thank you. Maybe we can do some of the electrophoresis or something.

CAPCOM Okay, we'll work on that. Columbia Houston, we've got a suggestion of our own if you've got a minute.

SPACECRAFT Okay go ahead.

CAPCOM Roger, Jack. We don't want to interfere with your lunch in any way but we're interested in these particles that you're seeing and if you think that sometime during the next sunrise you have a chance to get on videotape either from the

elbow camera or from camera alpha. Try and get on videotape some pictures of the particles that you're seeing. We'd be interested in getting that.

SPACECRAFT Okay, we'll try and do that. I noticed that they don't seem to be going the same direction this time as they were as I reported this morning. They seem to be doing more coasting and drifting out the back end at a slow random rate where as before they had a definite direction. Some had some high velocity.

CAPCOM Okay, and we're assuming that sunrise is the best time to see those. We don't want you to point the cameras at the sun or anything like that but we think we might be able to pick these up with the CCTV's.

SPACECRAFT Okay.

CAPCOM And also the scan of the nose has a higher priority so we want to make sure that you get that in also.

SPACECRAFT Okay.

CAPCOM Why don't you just make this your call and if you finish lunch a little bit early and think you have time to fit that in we'd like to see it.

SPACECRAFT Okay, the film problem is not as pronounced as it was. Well, it's not as dense a cloud and not as high a velocity. Just some stuff drifting out of the backend.

CAPCOM Okay, we understand that and if you do have a chance to try and get a VTR of the particles we'd also like you to train the RMS elbow camera on the micro foil abrasion experiment that's on the top of the thermal canister and get a picture of that on the VTR also.

END OF TAPE

PAO minutes mission elapsed time. We're within 10 seconds of acquiring at Buckhorn.

CAPCOM Columbia Houston, we're back with you stateside for 19 minutes.

SPACECRAFT Okay, are you using the FM for something else, I could crank that camera up right now as you're thinking and give you an early preview.

CAPCOM Gordo, we appreciate that but we have not got Goldstone configured for downlink TV so I'm afraid we wouldn't see any of it.

SPACECRAFT Okay.

CAPCOM Just a couple notes. We noticed that after the OPS mode recall, the OPS 201 recall, we need to get the star trackers back in the track mode and we'd like you to call up and resume spec 21.

SPACECRAFT Okay.

CAPCOM And also, you've got a go at your convenience for an item 48 to both GNC and SM to clear the air locks. Columbia Houston, how do you read?

SPACECRAFT Unclear. Did you say that I was go for clear item 48?

CAPCOM That's affirmative. We were in a handover there. You're go for an item 48 to both GNC and SM.

SPACECRAFT Okay.

CAPCOM And Jack, something that you may be interested in. Tim is feeling quite a bit better today, temperatures down, and he's drinking lots of fluids and he was real happy that you asked about him.

SPACECRAFT Oh boy, that's good news, he and I are on the fluid bit together, I'm glad he's doing well and (garble) we'll (garble) in the fluids together, we'll make a pack to do that.

CAPCOM Sounds like a good idea.

SPACECRAFT Another clear day at Edwards. (garble) It looks like it is oughta be drying the water up. How about that?

CAPCOM Roger, that a little bit late, but I think it's drying out there. Columbia Houston, we're still looking into the moisture problem on the windows. We'd just as soon you not use

anything on those windows either the defog or the alcohol wipes. We're not quite sure, we really don't want to put anything on the windows until we've done some kind of analysis but you might think about trying to direct some air over those windows if you can either manufacture some kind of ducts out of pieces of white data file or whatever. We're working on procedures of running the 1 G trainer but that's something you might think about.

SPACECRAFT Okay, I don't think it's a general problem. When you wipe them off they stay clear for 5 or 10 minutes and then they start forming up again.

CAPCOM Okay, we understand that. Columbia Houston

SPACECRAFT Yea, Sally.

CAPCOM Roger, Gordo, we've got about 2 and 1/2 minutes left in this pass and just wanted to extend a little bit on the nose survey. We don't want you to just stay in the arm configuration called out in the PAO TV maneuver. We'd like to get a good scan of as much of both sides of the nose and the top of the nose as you can get. We're interested in the sides of the Orbiter as well as the top, so just whatever pictures look best to you.

SPACECRAFT Okay, I think we got the same interests.

CAPCOM Okay, good.

SPACECRAFT And, Sally, the electrophoresis is unstowed to setup.

CAPCOM Roger, Jack, we copy.

SPACECRAFT You might them though, you can't have any easy time that's under the side of the lower accelerometer recorder package. That's pretty indistinct. I think I got it but I'm not sure.

CAPCOM Okay. Columbia, we're 1 minute to LOS. Dakar is next at 3 plus 13, about 5 minutes. We know you're about to start your meal but if you get a chance, the payloads people would like you to fill out one of the induced atmosphere logs that you find on page 3-6 of the payload checklist. Sometime between about now and 20 after the hour.

END OF TAPE

CAPCOM With camera Charlie messing up....

SPACECRAFT Actually the one we have is the one you need finally got lots of redundancy that is the major concern right?

CAPCOM That is affirmative, and if we do decide to deploy the PDP we would use that so there would be no impact to the arm operations in that case.

SPACECRAFT Okay and one of the immediate questions is, were sitting here with a lot of cameras turned on and do you recommend we shut some down?

CAPCOM Stand by

SPACECRAFT And we want to know to if you want to fire the star trackers up again?

CAPCOM Jack, were 30 seconds to LOS you can leave the star trackers off until were back in 1 GPC ops.

SPACECRAFT Okay turning it off, but the power is on to turn it on.

CAPCOM Roger. And Columbia, the cameras are your call and were going LOS we'll talk to you at Hawaii in 16 minutes.

PAO This is Shuttle Control, Columbia out of range at Orroral, next station Hawaii in 16 minutes. Columbia's back in proper attitude after completing the interaction test. During this pass the Pilot Gordon Fullerton commented that on reflection he and Jack Lousma recall pieces of white stuff coming back against the windshield during power flight, during launch, said that Lousma remembered a big chunk of it hitting his windshield, he reported that there are some smears on the windshield apparently from the strikes they now seem to believe that the white stuff was tile, and pieces of tile. CAPCOM Sally Ride informed the crew that we don't think that the missing, the tiles that are missing are in bad places, there should be no thermal problems because of the missing tiles. And finally Fullerton reported that he believe he could safely grapple the plasma diagnostic package in daylight with the remote arm without the assistance of the wrist camera. Simulations are being run here on the ground to determine that now and procedures for doing that to see whether we think that's possible. And CAPCOM Ride told the crew that the IECM people probably will not want their device deployed. Because television camera Charlie is not operating. At 1 day 2 hours 28 minutes this is Shuttle Control Houston.

PAO This is Shuttle Control at 1 day 2 hours 42 minutes

mission elapsed time. Columbia coming up on acquisition through Hawaii.

CAPCOM Columbia, Houston through Hawaii for 4 and a half minutes.

SPACECRAFT Okay, we got you through Hawaii.

CAPCOM Your loud and clear Jack and I got a small flight plan change if you got the CAP out.

SPACECRAFT Yes, we both got one, tell us the page and we'll follow you through when we get over looking at these pictures here.

CAPCOM Roger, you might check page 4-22 which is right after your meal coming up.

SPACECRAFT Okay, I'm there, Gordon's getting there go ahead.

CAPCOM Okay, I told you earlier that our plan is to have you set up the RMS and then we'll use that real time TV pass to get live TV from the elbow camera of the nose area of the orbiter, right now there's an EETV sample one scheduled for that time frame. We intend to reschedule sample one, so what we'd like you to do is do the EETV unstow and setup the timeline which is coming up on just about now, just before your meal, we'd like you to go ahead and do that but don't do sample one yet, we'll reschedule that later in the flight plan and you can just pick up with sample 2 on time. Which will be at about 6 plus 20 in the CAP.

SPACECRAFT Okay we'll do that understand.

CAPCOM Okay and that is all that I have.

SPACECRAFT Okay we finished the get away special for this pass and I got some pg data time starting with number seven 2:30, that's 7 and 25.9, 25.8, 25.3, 25.5, 26.5 and 28.0.

CAPCOM Roger we copy you Jack,

SPACECRAFT And all the lights are the way they are supposed to be.

END OF TAPE

CAPCOM Columbia Houston through Yarragadee for 6 and 1/2 minutes. Columbia Houston through Yarragadee, how do you read?

SPACECRAFT Okay, we're hearing you loud and clear through Yarragadee. We got the interaction test off just right that time and we're mellowing back to attitude in which we can start the roll rate again to make the panel folks happy.

CAPCOM Roger, we copy, that's good work and we understand that the PRCS test part 2 is complete and you're on your way back to attitude.

SPACECRAFT That is affirm.

CAPCOM Okay and Gordo, it looks to us like a good place to park the arm for lunch is in the arm position that is called out for the PAO TV maneuver back in the end of the unloaded on section.

SPACECRAFT Okay.

CAPCOM That's probably a good arm configuration to start from anyway. And that's on page 1-23 of the PDRS checklist.

SPACECRAFT Okay, we got it, we'll head over that way.

CAPCOM Roger.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead, Gordo.

SPACECRAFT Okay, I've some thoughts on the nose tile problem. Jack noticed fairly big chunk of white stuff shortly after launch come flying back and hit the windshield. I noticed several pieces of white things and I could well believe they were moving fast of course, but, I could easily believe they were white tile. There are splotches on my windshield and Jack's also that looks like that's probably what happened. They had to have slid along the glass for awhile before bouncing off.

CAPCOM We copy that.

SPACECRAFT And we were looking for colors specifically in the debris and neither of us saw anything that looked at all brown like the sophial on the tank but no black but white was the color that and the only color I saw.

CAPCOM Roger, Gordo, and just for information we think that from your descriptions earlier in the morning and of those missing tile seem to be in particularly bad areas. We don't

anticipate any thermal problems from the ones that you saw.

SPACECRAFT Are you talking about during more than just this look on the top and making them one complete tile inspection.

CAPCOM As a matter of fact we did have the fourth team working on a more extensive inspection but we were planning on using the wrist camera for that inspection. And we're 15 seconds to 1 minute LOS over Australia.

SPACECRAFT Roger.

CAPCOM Columbia Houston, we're back with you through Orroral Valley for 2 and 1/2 minutes

SPACECRAFT Okay, Sally, it appears to us that we're back in a proper attitude, the rural angle and so forth, we'd like you to confirm that.

CAPCOM Okay, Jack, we just got data and we'll take a look.

SPACECRAFT Also, Sally, thinking looking ahead it's our opinion in daylight that we could safely grapple a PDP just looking out the window maybe with the help of binoculars, whatever, but not hurt anything, and get the end effector down over the grapple fixtures.

CAPCOM Roger, Gordo, we're thinking about that too and we've got Richard and Hank working on the MDF to do exactly that and we'll try and come back to you later on this afternoon with the plan, but right now we're tending that way also.

SPACECRAFT Okay, probably be done on the IECM also but I guess we're also up against the problem of only 1 aft camera.

CAPCOM That's correct. And Gordo, it sounds like the IECM people really do not want to be deployed with that camera missing. With camera Charley mission, that is.

SPACECRAFT Yea. Actually

END OF TAPE

CAPCOM Okay right now we still don't have a good way to recover the wrist camera, but we are thinking about a partial inspection of the nose area with the elbow camera, and we've got, we were scheduled for live TV of the EETV later on this afternoon, in fact right after your meal. We're tenatively thinking of asking you to position the arm in a place where the elbow camera gets a good view of the nose and maybe using that TV pass to pan and tilt the elbow camera to get us a good view of the nose area as you can. And what that would involve is after part two of the interaction test rather than powering down and cradling the arm just leave it out, eat the meal and right after lunch we'd give you license to just keep the arm in view and try and get, find a good arm location where you had a good view of the nose with the elbow camera.

SPACECRAFT Okay, that sounds like a good plan. problem here is, well I think it will work out alright, with tail sun here you don't get the greatest lighting on the nose but ....it'll ....I think we'll get a picture.

CAPCOM We understand that, and we just for interest, we had a great picture coming down through Mila at the last state pass of the nose and the Earth in the background, really looked nice.

SPACECRAFT Okay, I noticed generally this tail sun, course we got some tremendous reflections when the arm is out, the arm is shadow cast by ... aft bulkhead and so forth. And, a lot of these VTR pictures aren't going to be really very spiffy because of the reflections drive the Iris wild, and I've tried using the peak average ... iris ... with any better luck either.

CAPCOM Roger, we understand.

SPACECRAFT Another comment for somebody to work on, is that we still have moisture on the aft windows we keep trying to wipe it up very successfully, except it leaves a smear and some moisture on it and its' not going to be very good for taking any pictures through, I wonder if the defrost, substance we use for the helmets would be, we'd be able to use that on the inside of these windows if we ever did get them dry, or do we expect to get them try so we can use them later?

CAPCOM We'll start thinking about that and get an answer for you as quick as we can.

CAPCOM And we're 30 seconds to LOS Yarragadee's next at 2 plus 16, and we'll again try and leave you alone for the PRCS interaction test part two.

SPACECRAFT Okay, we'll try and do better next time.

PAO This is Shuttle Control, Columbia's out of range of Dakar now. Next station is Yarragadee in 28 minutes. Crew will begin the second part of the interaction test in about 6 and a half minutes as soon as they get into the night side of this orbit number 18. We've told them during this pass at Dakar not to cradle the arm after the test, but the tenative plans for this afternoon are to inspect the nose where the tiles are missing. With the elbow camera on the remote arm its likely we'll subsititute that television for what had been planned, the electrophoresis test. Jack Lousma reported that there is still moisture on the aft windows when they wipe it off it smears the windows he's concerned that they might not get good photography through those windows. And he ask whether he should apply some antifogging compound that they use for their helmet visors, whether that would help the windows, we're taking a look at that suggestion. At 1 day 1 hour 48 minutes mission elapsed time, this is Shuttle Control Houston.

END OF TAPE

CAPCOM Columbia that's the end of our troubleshooting procedure for the wrist camera for the time being. You can go back to the PDRS checklist and just for information the part 2 of the PRCS interaction test calls for you to use camera Charlie, I'm sorry, calls for you to use the wrist camera on the VTR, we'd like you to use camera bravo instead of tha, and just press ahead with the PRCS test.

SPACECRAFT Okay, and tell me, it was delta you wanted to use for the ... right?

CAPCOM That's affirmative.

CAPCOM Columbia, Houston just for information we turned the FPEG filament on a couple minutes ago its on now it'll be going off again in about 10 or 15 seconds, you might take a look and see if you can see it out there.

SPACECRAFT ....time and I can't

CAPCOM Okay

SPACECRAFT .....

CAPCOM Roger, we expect that it probably will be visible at night and we just turned it off. Seems to be working fine.

SPACECRAFT Okay

CAPCOM Columbia, we're 40 seconds to LOS and Dakar is next in six minutes.

SPACECRAFT Okay.

PAO This is Shuttle Control, Bermuda has loss of signal with Columbia. During this pass we reset the circuit breaker that affects the elbow and wrist cameras on the remote arm, we activated the elbow camera that worked fine, we had a picture from the elbow camera when we shifted to the wrist camera the circuit breaker popped again, situtation will continue to be studied, we've also had a circuit breaker problem with the data acquisition camera, the only one that appeared to be still running, that circuit breaker has popped on that camera also. That reported at Buckhorn pass by Jack Lousma, the run lights on the other back cameras have not been on, they the lights may have failed and the cameras may be running and there is no way to tell whether those other data acquisition cameras are running or not, because no lights will come on. The only camera on which the light would come on and show run now is lost because of the circuit breaker we've not yet tried to reset that circuit breaker. Next station is Dakar in four minutes. At 1 day 1 hour 37 minutes mission elapsed time, this is Shuttle Control Houston.

PAO This is Shuttle Control at 1 day 1 hr 41 minutes, mission elapsed time. Dakar is about to acquire Columbia.

CAPCOM Columbia, Houston through Dakar for five minutes.

SPACECRAFT Okay Sally, we just finished the operator command and the precradle was uneventful went right back there and stopped without any operation whatsoever.

CAPCOM Okay that's right, those people will be glad to hear that.

CAPCOM Columbia, Houston I'd like to take a minute and talk about our tenative plans for the afternoon if now is a good time.

SPACECRAFT Okay, give us the word.

CAPCOM Okay, right no we still don't have a good way to recover the wrist camera, but we ....

END OF TAPE

SPACECRAFT pitch pulse, professionally it's all white and we put in the .... we got the pulse but like it reversed itself when going back to decal again it kinda of .... partly taken out again.

CAPCOM Okay, we'll take a look at that and we'll try and get that information up to you.

PAO This is Shuttle Control. Orroral has loss of signal now. During this pass the crew reported they had looked at some wrong information, had gotten and knew some edited excursions that they had not intended to during this particular test and were afraid they might have compromised some of the thermal data but that does not appear to be the case, there's no concern that the thermal data was compromised. They are now back in the proper attitude. Next station is Buckhorn in 23 minutes. At 1 day 55 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 1 day 1 hour 17 minutes mission elapsed time. Columbia coming up on acquisition through Buckhorn station.

CAPCOM Columbia Houston with you stateside for 17 minutes. Columbia Houston, how do you read?

PAO This is Shuttle Control. We may attempt to do a TV pass with the elbow camera at Myla acquisition on this stateside pass. That's being discussed at this time.

CAPCOM Columbia Houston, how do you read? Columbia Houston, how do you read now?

SPACECRAFT Okay, we're reading you 5 square, how about me?

CAPCOM Okay, you're the same, and we were having a loud tone on there to ground 1 that's cleared now so we're receiving you fine.

SPACECRAFT Sally, we're about to do the .... pitching course rate into the test ....

CAPCOM Roger, we'll watch that with interest. And Columbia the teleprinter message that we just sent up to you is the entry weather.

SPACECRAFT Thank you. Hey, Sally, it stopped at 1 plus 1.2 degrees.

CAPCOM Okay, we copy that and, Gordo, when you're at a good place to stop we'd like to start setting up to see if we can recover the wrist camera.

SPACECRAFT Okay, as soon as we finish this page off will be a good place.

CAPCOM Okay.

SPACECRAFT And are you planning on TV of the EEVT this afternoon or should I not worry about setting that up right now?

CAPCOM Jack, don't worry about setting up the camera for the EEVT specifically. We'll be using that TV pass but we may be shooting pictures of something else.

SPACECRAFT Okay, on one of the circuit breakers that popped, on the DACs, the only one that was running, mid aft main B popped open.

CAPCOM Roger, we copy, mid aft main B is open. I guess that leaves us no DACs.

SPACECRAFT (garble) are running without the lights coming on or not. We've been planning like they are.

CAPCOM Roger.

SPACECRAFT I've not tried to reset that breaker.

CAPCOM Gordo, we'd like to worry about the DACs later and work on the wrist camera if you're ready.

SPACECRAFT Okay, we're both ready to work on the wrist camera.

CAPCOM Okay, what we'd like you to do is set up to have the elbow camera on monitor 2 and on panel R15 rows delta and echo verify that all the

END OF TAPE

PAO And on the night side has heating affect on the vehicle, it'll be back at tail sun at the conclusion of this test. At one day thirty two minutes mission elapsed time this is Shuttle Control Houston.

PAO This is Shuttle Control at one day 40 minutes mission elapsed time, we have acquisition through Yarragadee.

CAPCOM Columbia, Houston back through Yarragadee for six and a half minutes, and were just standing by.

PAO This is Shuttle Control, the crew is continuing the RMS interaction test with the RCS it continues throughout the night side of this orbit. About another 17 minutes. There will probably be very little conversation, if any during this pass. We'll stand by.

PAO This is Shuttle Control, Yarragadee has loss of signal, Columbia will be within range of the Orroral Valley station in a minute and a half, we'll stand by for that pass.

SPACECRAFT This is Columbia, you there?

CAPCOM That's affirmative, were AOS through Orroral Valley.

CAPCOM Columbia, Houston how do you read?

SPACECRAFT Okay, now how do you read me?

CAPCOM Roger Gordo, your loud and clear. We were LOS for about 2 minutes over Australia.

SPACECRAFT Okay, we mixed this up a little bit Sally we got trap waters that we went over to day one and didn't notice. And so the result was our rotation start times were loaded day zero and therefore did the item 20 we started the rotation immediately and therefore didn't get back to the roll attitude, and so while the RMS data may be okay, we got the pulses in there, the we jimmied the thermal attitude on the (garble) trying to get back now on the, we will be shortly (garble) and no excuse.

CAPCOM Okay, we understand that's no problem and if you need a roll attitude to get back to, I've got one, if Cue Cards working for you, we won't pass it up.

SPACECRAFT We've got roll 306 at 55, is that going to work okay?

CAPCOM Stand by we'll check.

CAPCOM And Columbia, it looks to us like that roll will work, and we see that your back in attitude now.

SPACECRAFT Houston, can you give us a sample of what we might have done to thermal data?

CAPCOM We're looking at that now. But we don't think you need to worry about it, thermal data it's looking alright and it looks like the thermal test is, the temperatures are holding a little bit higher than we expected so we expect that thermal test to be pulled up all right.

SPACECRAFT Okay, good thank you.

CAPCOM And we'll update you on that if there is any change.

SPACECRAFT Okay, our apologies to the Flight Controller.

CAPCOM And Gordo, could you verify that you got all four of the sequences done in the CRCS test?

SPACECRAFT Incidently, I (garble) back there

CAPCOM Okay, that's good, thank you.

CAPCOM And Columbia, we recommend that you use DAP A to cut down on the over shoot that you are seeing now, attitude.

SPACECRAFT Okay, thank you we got it in.

CAPCOM Columbia, we're 40 seconds to LOS we'll talk to you state side in 24 minutes, and over the states we'll have a procedure to try and get the wrist camera back.

SPACECRAFT Oh that's good, hope it works.

CAPCOM So do we.

SPACECRAFT data after you get it, on the ... it felt like....

END OF TAPE

PAO arm television cameras.

CAPCOM Columbia Houston through Madrid for 5 and 1/2 minutes, over.

SPACECRAFT Okay, we're hearing you at Madrid.

CAPCOM You're loud and clear, Jack.

SPACECRAFT Okay, we're into 2 of the preliminaries for the interaction test.

CAPCOM Roger.

SPACECRAFT And for attitude, is there no respect to the thermal requirements?

CAPCOM Standby Jack. Jack the attitude looks great to us.

SPACECRAFT Okay.

CAPCOM Columbia Houston, we're 1 minute to LOS Madrid. We'll talk to you next at Indian Ocean at 0 plus 24 and we'll try and leave you alone during the interaction test.

SPACECRAFT Okay, we'll see you at LOS.

CAPCOM Roger. And Columbia, going over the hill, just a reminder to get the depth and post pulse pulse before the interaction test.

SPACECRAFT Yea, we'll do that. We just did some of the preliminaries, we'll go down to the procedure and verify it all again and thank you for the reminder.

CAPCOM Roger.

PAO This is Shuttle Control. Madrid has loss of signal. Next station is Indian Ocean in 11 minutes. Flight Director Neil Hutchinson has decided to delay the attempt to reset the circuit breaker. He wants some of the backroom people to have an opportunity to study the playback of the data during the time the crew believes the breaker popped. That's some time between 23 hours 30 minutes and 23 hours 40 minutes. That data is not ready to play back yet, so the attempt to reset the breaker will be delayed. Interaction test will begin at the Indian Ocean station. Crew has completed preliminaries for that test. The remote arm is in the position and the reaction control system is being prepared for the firings that will take place to

study the dynamics of the arm while the reaction control system is operating. At 1 day 14 minutes mission elapsed time this is

Shuttle Control Houston. This is Shuttle Control at 1 day 23 minutes mission elapsed time. Shuttle is approaching acquisition at the Indian Ocean station.

CAPCOM Columbia Houston through Indian Ocean for 7 minutes.

SPACECRAFT Okay, we won't be talking much, too far to this , Sally.

CAPCOM Roger, we copy. Columbia, we're 50 seconds LOS, we'll talk to you at Yarragadee at 0 plus 40, that's 10 minutes from now.

SPACECRAFT (garble)

PAO This is Shuttle Control. IOS has loss of signal. Next station Yarragadee in 9 minutes. Both crewmen extremely busy now doing the interaction tests between the remote manipulator system and the reaction control system. This test is done on the night side of the orbit because Columbia gets out of the tail to sun attitude during this test when the reaction control system jets fire and on the night side has the least

END OF TAPE

CAPCOM this next dark pass over Indian Ocean the payload people are going to be turning on the FPEG filament to check it out and you may or may not see that, just wanted you to be aware it'll be coming on.

SPACECRAFT Alright will be AOS do you have a time to start looking for it?

CAPCOM That's affirmative, we oughta be AOS over Indian Ocean in about 024 to 25.

SPACECRAFT I'm going to take a look.

CAPCOM Roger, that's about a half an hour from now.

CAPCOM And Columbia Houston, CRT 1 is yours.

SPACECRAFT Thank you.

CAPCOM Columbia, Houston to help us analyze the risk camera problem, could you give us an approximate time for when you selected that camera and assume the circuit breaker popped so that we can go back and look at our data.

SPACECRAFT Yes, I got it down here at about 2330, to 2340.

CAPCOM Okay thanks Jack, that will help a lot.

SPACECRAFT Welcome.

CAPCOM Columbia, Houston with one minute left over the states we see that you got a fault message S76 comm, could you tell us what that was?

SPACECRAFT Oh yes, I'm sorry Sally, I'm into, I got that in yes, we got that at about 22325 and there were three items on there, two of them had to do with the S-band pm power amplifier temperature one was -9 off scale low temperature two minus 11 off scale low, and the other had to do with KU-band temperature was -75 on the scale low, and those were the only ones that were on there. Nothing to do with the CCTV cameras.

CAPCOM Okay Jack, we copy that, that was our question, and we got twenty seconds left, Madrid is next in six minutes and just for information we will not be recording voice after this state side pass.

SPACECRAFT Okay, we're going to do those G2 GPC op

CAPCOM Roger.

PAO This is Shuttle Control, Bermuda has loss of STS-

signal, Madrid is next in about five minutes. During this pass over the United States the crew discovered that another circuit breaker had popped, the circuit breaker affects both the wrist and elbow cameras on the Remote Arm. Flight Director Hutchinson does not want to try to reset that circuit breaker until after the data is better understood. Flight Controllers are now studying that data to determine whether we will try to reset that circuit breaker. These are the cameras that would be used during the tile inspection which is planned for this afternoon. So we'd like to recover them if at all possible. We've postponed the grapple test on the Remote Manipulator System those cameras are necessary particularly the wrist cameras' necessary to grapple a payload. We'll proceed to the interaction test, in which the reaction control system, the attitude control jets will be fired with the arm in various positions. The camera is not required for this test. First part of this test is scheduled to begin in darkness which will be at the Indian Ocean station, night is about twenty and a half minutes away, the night side of the orbit. At one day three minutes mission elapsed time, this is Shuttle Control Houston.

PAO This is Shuttle Control at one day six minutes mission elapsed time. Madrid will acquire Columbia in about 15 seconds, we will attempt to reset the circuit breaker during this pass. It's the circuit breaker that affects the Remote Arm television cameras.

END OF TAPE

PAO This is Shuttle Control. Orroral has loss of signal with Columbia. Next station is Merritt Island in Florida about 30 minutes from now. Crew now appears to be about perhaps 5 minutes ahead of the timeline. They've had some problems with the data acquisition cameras. They can verify that one of those is running but several others appear not to be running but they've been told to proceed as if all of them were working. We've also passed up some changes to enable them to use a different television camera in the payload bay for some of the RMS checkout because camera Charley appears to be lost due to a power spike. A team headed by flight director Chuck Lewis has been activated to select procedures for the tile inspection that's planned for this afternoon. Documented procedures are onboard from that set of procedures. This team headed by Lewis will pick the proper procedures to use for this inspection and we'll pass that information up to the crew in plenty of time for them to study it before the operation begins. At 23 hours 21 minutes mission elapsed time this is Shuttle Control Houston.

Houston contact MOLECON TAC care ground 1.

Yea, Houston, I'd like a keying and voice check on the air to ground 2, please.

PAO This is Shuttle Control at 23 hours 49 minutes mission elapsed time. Columbia's over Mexico on the 17th orbit. Will be within acquisition of the Merritt Island Florida tracking station in about 5 seconds, we'll standby.

SPACECRAFT Houston, Columbia.

CAPCOM Roger, Columbia, we were just about to call, we're AOS stateside.

SPACECRAFT I got some more things for you to work on. When I went to do the end effector grapple test I got the RMS wrist and no picture on the monitor, looked down and the same circuit breaker on it is popped out. We're pretty sure it popped right then although we were'nt there to hear it pop. We have not tried to reset it.

CAPCOM Roger, we copy, that's the circuit breaker that controls the wrist camera and the elbow camera.

SPACECRAFT That's right. That's a bad one to lose. We set the first of the three, I think that's the pan tilt camera.

CAPCOM Okay, pan tilt camera and we understand you did not try to reset that.

SPACECRAFT Affirmative. We thought we'd wait till a few minutes.

CAPCOM Okay, we concur and we'd like to look at the data. Columbia Houston, while we're looking into the camera problem we'd like to change the variable parameter downlist. If you could give us spec 12 to a GMC machine we'll start that.

SPACECRAFT Okay we'll get it

CAPCOM Roger, thank you. Columbia Houston, a couple of things, just a reminder we'd like to get that tire pressure if you could power up the DFI.

SPACECRAFT Okay, Sally, thanks for reminding me, they should be coming at you right now.

CAPCOM Okay, thank you and also we'd like to take a look a little while longer at the camera problem which means that we'll abort the end effector grapple test for now and we'd like to just continue with the RMS PRCS interaction test which shouldn't require that camera so you can prepare for that test and it'll be coming up over the next dark pass.

SPACECRAFT Okay.

CAPCOM And Gordo, also note of interest, during this next dark pass over Indian Ocean the payload people are going to be turning on

END OF TAPE

CAPCOM Columbia, Houston when you get to the back up mode validation which is the next (garble) that you come to on page 1-4, it calls out for VTR of camera Charlie, would like you to replace that with Camera Bravo.

SPACECRAFT Okay, Bravo instead of the broken one.

CAPCOM That's right, and we've taken a look at some of the play back data, I'm sorry some of the real time data that we got and we did see a spike on the line, an eleven amp spike that caused the circuit breaker to pop so it looks like to us camera Charlie is down.

SPACECRAFT Okay.

CAPCOM Columbia, Houston we got a minute and a half left in this pass. Just for your planning purposes we're looking at the possibility of doing inspection as you suggested of the nose area, sometime this afternoon, and we'll plan to get detailed procedures up there in plenty of time for you to look them over, the procedures exist in the PDRS checklist, and we're working on a flight plan now and thinking about what procedures we want to run and running them in the simulators.

SPACECRAFT Okay, that's a good idea, one thing I might mention about our validation run here that... don't seem to wanna work, we got all in twenty four frames, circuit breakers are all in, first time I turn them on I got about four of the run lights came on then they all went off immediately, except the mid aft, it is the only one that seems to be giving us a run condition.

CAPCOM Roger Jack, we copy that. And we've got twenty seconds left here a two minute LOS over Australia, just for information looks to us like the particles that you saw, we've done an anaylsis we're looking at them and we don't think that your losing any consumables, but we're still interested in taking pictures.

SPACECRAFT Okay, if you have a good setting for them let us know. You only see them pretty much with a black sky at night, I should say, or just at twilight, and there about the intensity of bright stars so if you have a camera setting with a thirty five or seventy we'll do that.

CAPCOM Okay, we'll look for a setting for you.

PAO This is Shuttle Control, Yarragadee has loss of signal, Orroral will pick up Columbia in about a minute. It appears that camera Charlie in the aft starboard bulkhead of the payload bay is lost because of a spike, outer spike, there's

still three payload bay television cameras remaining in addition to two cameras on the Remote Manipulator Arm. CAPCOM Sally Ride informed the crew that we do plan to do an inspection of the nose area where there appears to be some tiles missing, current plan is to do that after lunch. Crew lunch is scheduled at to end about one day four hours mission elapsed time sometime after that time, we would do that inspections. Procedures for the inspection are onboard we'll pass, select which ones we want to use and let the crew know. We now have acquisition at Orroral.

CAPCOM Columbia, Houston back with you through Orroral Valley for four minutes.

SPACECRAFT Okay, we're starting at the top of page 1-4.

CAPCOM Roger 1-4, and Gordo the only other place that we could find camera Charlie called out for data is in the operator command to precradle on page 1-18, and we'd like for you to use camera Delta at that time.

SPACECRAFT Okay.

CAPCOM Columbia, we're one minute to LOS, the states are next in half an hour.

SPACECRAFT Okay we're running all these over working but I betcha they aren't.

CAPCOM Roger, we understand that, and we'd like you to keep going.

END OF TAPE

PAO ...camera charlie. That's a black and white television camera located on the starboard bulkhead, the aft starboard bulkhead in the payload bay. There is a circuit breaker that has popped out preventing operation of this camera. We've asked them not proceed with trying to push that circuit breaker back in until we do some more checks. There's no problem with that camera being unavailable for todays operations. We can proceed without it and that's we're in the process of doing. At 22 hours 40 minutes Mission Elapsed Time. This is Shuttle Control Houston.

PAO This is Shuttle Control at 22 hours 50 minutes Mission Elapsed Time. Columbia coming up on acquisition through the Indian Ocean station.

CAPCOM Columbia, Houston through Indian Ocean for five minutes.

SPACECRAFT We're sorry, we're on page 1-6 doing a back up .... check here. So far so good.

CAPCOM That's good and I assume there was no problem with the stow times or the latch times.

SPACECRAFT That's right Sally. They were all a little (garbled)

CAPCOM Roger.

CAPCOM Columbia, Houston. One minute left in this pass. Yarragadee is next at 23+05. And, I've got a couple of camera replacements for VTR where we had called out Charlie, we've got alternate cameras if you'd like to turn to those pages in the checklist. Flight supplement 1-4 is the first one.

SPACECRAFT Okay. ....

CAPCOM Okay Gordo there's 30 seconds left here we'll get them at Yarragadee. We don't think that you'll be to those places before then.

SPACECRAFT Sally, you still there?

CAPCOM That's affirmative. We'll talk to you at Yarragadee in 8 minutes.

SPACECRAFT Okay and the power checkouts was complete. No problems at all.

CAPCOM We copy.

PAO This is Shuttle Control. Indian Ocean station has

lost signal with the Columbia. Next station is Yarragadee Australia in 7 1/2 minutes. Gordon Fullerton running considerably ahead of the timeline in the crew activity plan during this remote manipulator system checkout and validation testing. He appears to be on the order of 25 minutes ahead of the timeline that's in the crew activity plan. He reports that the activty is going well and no problems thus far with the remote manipulator system. At 22 hours 58 minutes Mission Elapsed Time. This is Shuttle Control Houston.

PAO This is Shuttle Control at 23 hours 5 minutes Mission Elapsed Time. Columbia approaching acquisition through Yarragadee.

CAPCOM Columbia, Houston through Yarragadee for 7 1/2 minutes over.

SPACECRAFT Okay we're hearing you through Yarragadee. We'll about to do the validation run.

CAPCOM Roger we copy and your loud and clear.

SPACECRAFT Yeah, you're much better now. We changed our batteries in the mike units and I think that's better.

CAPCOM Roger. Copy that you changed the batteries.

SPACECRAFT My first out cast Sally is coming right back....

CAPCOM Sounds good.

END OF TAPE

PAO Orbit with an orbital period of one hour twenty nine minutes, twenty five seconds. During this pass over the United States, Jack Lousma remarked that the difference, in the appearance of the Earth from this altitude then when he last saw it aboard Skylab, Skylab was at an altitude of approximately 250 nautical miles. Handover between Flight Control teams and now taking place and were estimating the change of shift news conference with Flight Director Harold Draun at 9 a.m. Cental Standard Time in room 135 at the JSC newscenter. At twenty two hours twenty eight minutes mission elapsed time, this is Shuttle Control Houston.

PAO This is Shuttle Control at twenty two hours thirty two minutes mission elapsed time. The Shuttle Columbia coming up on acquisition through Madrid.

CAPCOM Columbia, Houston the silver team is now with you for six minutes through Madrid.

SPACECRAFT Welcome back silver team.

CAPCOM Thank you Jack, and your loud and clear. And I've got one payloads note that requires a switch change over on L11 I believe, if there is someone back there.

SPACECRAFT We just don't seem to be hearing you Sally.

CAPCOM Okay, how's this?

SPACECRAFT Well that's okay, what do you need?

CAPCOM Roger Gordo, back on panel L10, we'd like you to switch the track select to track two and that is so the ground can monitor the qualitity of the data. And that should be tape recorder number one, track select to track two.

SPACECRAFT .....right now monitor level bravo.

CAPCOM Okay, and for your information the fuel cell purge looked real good.

SPACECRAFT Thank you. Sally we got nothing on camera Charlie right now, we're looking at the brakers to see if one of them got.....

CAPCOM We copy, nothing on camera Charlie.

SPACECRAFT okay we (garble) fix (garble) one braker was out...

CAPCOM Okay we copy, you reset the braker.

SPACECRAFT (garble) just poppped back out

CAPCOM Okay we'll take a look at that.

SPACECRAFT The b and d all are working okay so far.

CAPCOM Gordo was the bravo and delta that are working fine?

SPACECRAFT (garble) bravo and delta.

CAPCOM Roger.

CAPCOM Columbia, Houston we're going to take a look at the signatures from the braker we'd like you to leave that circuit breaker out until we get a chance to take a look at the data.

SPACECRAFT Okay, I'll leave it out.

SPACECRAFT (garble) arm it's cranking out.

CAPCOM We copy.

SPACECRAFT About twenty eight to thirty seconds.

CAPCOM Copy, twenty eight to thirty seconds, And Columbia were thirty seconds LOS Indian Oceans' next in about 12 minutes.

SPACECRAFT (garble)

PAO This is Shuttle Control, Madrid has loss of signal. Next station the Indian Ocean station in 11 and a half minutes. Pilot has powered up the Remote Manipulator System and is checking it out at this time, gearing for unloaded validation runs and tests, in an unloaded state on the Remote Manipulator System. Reported that they cannot get a picture on camera Charlie, that's a black and white television camera

END OF TAPE

SPACECRAFT Okay, we did the temp monitor and most of the temperatures we got are, with the exception of jack number 80 is 66 degrees, jacks 1 through, jack number 8 is 66 degrees and 1 through 6 are 70 to 75 degrees.

CAPCOM Copy that, thank you.

SPACECRAFT And it does seem more comfortable in here now.

CAPCOM Okay, that's good. Be advised we're going to delay going back to voice record until at least IOS LOS, jack.

SPACECRAFT Alright, I'll give you the torqueing angle if you want them otherwise I did the torqueing at 220140.

CAPCOM Roger, we're ready if you'll read them down to us.

SPACECRAFT Okay, our..... is zero 7, can't read my own writing here, but anyway ..... IMU 1 it was plus 12.02 minus .03 minus .29, IMU 2 was minus 4.44 plus .00 plus .10, IMU 3 is minus .04 plus .19 and minus .33.

CAPCOM We copy, thank you.

SPACECRAFT And when you get a call time would you give my certain Tim a call and tell him I hope he's feeling better and ask him how he's doing, please.

CAPCOM Sure will.

SPACECRAFT Notice from this altitude compared to Skylab it's harder to find where you are because you're so darn much closer to everything.

CAPCOM Makes it hard to navigate. Columbia Houston, the RMS GM is onboard and spec 1 can be resumed.

SPACECRAFT Okay, thank you. What GM was that, Steve?

CAPCOM The one that changes the RMS current limits, Gordo.

SPACECRAFT How are they now?

CAPCOM They're now at 100 percent.

SPACECRAFT Okay. I hope everybody on the team is enjoying doing this for real as much as we are, Steve.

CAPCOM We sure are.

SPACECRAFT I think somebody must have finally got a hold of Sam Soup and gave him what he deserved.

CAPCOM That's right. Our view's not quite as good as yours either though.

SPACECRAFT Can we set that fuel cell purge now and let you look at it, Steve?

CAPCOM That's affirm. You can press with the fuel cell purge.

SPACECRAFT (garble) purge has started status at this time.

CAPCOM Roger.

SPACECRAFT Steve, I'll go ahead and do the gas step now.

CAPCOM Roger, we're ready for that, Gordo, go ahead.

SPACECRAFT Okay. And it looks like we picked up 0 brake, Steve, and we'd like you to look at it and make sure we got it right and if it's not quite right with us for you.

CAPCOM Okay, we'll take a look, 3 minutes left in this pass, Jack.

SPACECRAFT Okay, the gas level 3 is in mid level

CAPCOM Roger.

SPACECRAFT And the star trackers have been enabled, do you need another spec 21 cycle today?

CAPCOM Wait 1, Jack. That's a negative on the spec 21 cycle Jack, thank you.

SPACECRAFT Okay. Okay to go ahead and do this interconnect, then you can intercede in Madrid?

CAPCOM You can interconnect any time at your option Gordo.

SPACECRAFT Okay.

CAPCOM Columbia Houston, we're 1 minute LOS now. The crystal team's gonna leave you, silver team'll pick you up at Madrid in about 6 minutes and have a good day.

SPACECRAFT Okay, thanks for everything and we'll see you on your next shift.

CAPCOM Okay, and we'll give Tim a call for you.

SPACECRAFT Thanks a lot.

PAO This is Shuttle Control. Columbia has loss of signal with Bermuda. Next station is Madrid in 5 minutes and 15 seconds. Columbia's back in the tail sun attitude and in this attitude the payload bay looks constantly at deep space. Columbia now in the 130.8 by 128.8 nautical mile orbit with an orbital period of 1 hour 29 minutes 25 seconds. During this

END OF TAPE

SPACECRAFT Okay Steve, port RMS heater going auto, 3 2 1 on mark.

CAPCOM Okay, thank you and just leave them in auto then.

SPACECRAFT Okay

CAPCOM Columbia, Houston we're one minute LOS now there should be a teleprinter message number 8 on board, we'd like you to check that once we go LOS for us please, and that the AOS in the states could you SM spec 1 called so we can change some current limits on the RMS via TMBU's?

SPACECRAFT Okay, we'll do that, you got any objections to us maneuvering to align attitude early getting it done?

CAPCOM Have no objections to that Jack, go ahead were 30 seconds LOS now, next is Mila in about 30 minutes.

SPACECRAFT Okay.

CAPCOM And Columbia, Houston you may have to wait on the stars for that maneuver, you might check that.

SPACECRAFT Okay

PAO This is Mission Control Houston, twenty one hours forty six minutes mission elapsed time. The crew is beginning maneuver to an attitude for alignment of the inertial measurement units, part of the daily routine on getting the vehicle in its proper attitudes and the navigation procedures that are under gone. The Flight Controllers in Mission Control and NASA management officials are currently discussing the tile situation that was mentioned a little bit earlier on the crew having identified several locations on the front, out the front windshields where the white tile were either compelete tile appeared to be missing or portions of tile, those areas will be mapped off and an attempt will be made to identify exactly which tiles are missing so that there can be some further understanding of what the consequences might be of lack of some insulation or reduced degree of insulation in that area. We are still aiming at a 9 a.m. Central Standard Time with the off going Flight Director Harold Draun, assuming that circumstances allow him to leave Mission Control at that time this is Mission Control Houston at twenty one hours, forty seven minutes mission elapsed time.

PAO This is Shuttle Control at twenty two hours fifteen minutes mission elapsed time. Columbia's on its sixteenth orbit, coming up on acquisiton through the Merritt Island Florida tracking station shortly after this pass over the United States. The Flight Control team directed by Harold Draun will

hand over to Flight Director Neal Hutchinson and his team of Flight Controllers who will be responsible for Columbias' mission during the next twelve hours, we'll stand by for acquisition.

CAPCOM Columbia, Houston through Mila, for ten minutes, over.

SPACECRAFT Okay we're hear with you through Mila, we got the IMU alignment done, we got them torqued, we got back in tail-sun a little quicker, we're going to start our roll attitude a little sooner with your approval we'll take the attitude that's in there.

CAPCOM Stand by, and Columbia Houston you can maneuver early, but if you use the attitude that's in there you have to start on the CAP time, over.

SPACECRAFT Alright, I changed the roll to a different time to be good for two twenty two twenty, I got 38 degrees in there and that's what my card says it works, and I'd like you to confirm it.

CAPCOM Okay, we'll confirm it.

SPACECRAFT Looks like it ought to be about right, its ten minutes thirty to forty degrees.

CAPCOM Roger Jack, the roll does look good, and you can press on.

SPACECRAFT Okay, I'll dress it up a little bit for you if you like.

CAPCOM Columbia, Houston the roll you got loaded looks good to us, go ahead.

SPACECRAFT Okay, we did the temp monitor and most of the temperatures.....

END OF TAPE

CAPCOM Columbia Houston through Yarragadee for 6 and 1/2 minutes, over.

SPACECRAFT Consider the following information, take a look at it at Orroral which you can we've got two stars in the table, Star 49 and star 39. They're 8 or 9 minutes old and angle differences 82.6.

CAPCOM Roger, copy

SPACECRAFT I noticed the delta angle on the Y and V tracker, however, are plus .39 and a plus .33, respectively.

CAPCOM Standby. And Columbia Houston, at this point we cannot use stars of opportunity, Jack, we request that you do the alignment in the CAP, over.

SPACECRAFT Okay, we'll do that. We're set up for it, just want to give you that option.

CAPCOM Okay, thank you very much. When it comes time to interconnect today we will have you interconnect from the left OMS to the RCS, over.

SPACECRAFT Okay, Steve, understand we'll feed from the left.

CAPCOM That's affirmative, left OMS. Columbia Houston, how's the temperature in the cabin now?

SPACECRAFT Well I don't know what it is. We're reasonably comfortable. We got our jackets on. Probably ought to tell you though, read the PGU awhile ago and I don't have all the exact numbers on the tip of my tongue but they were from 22.6 to about 23.8. Most of them were between 22.6 and 23. There was only one that was over 23.8.

CAPCOM Okay, copy that. If you do want the cabin to warm up a little quicker you can turn on the second water loop and go to full interchanger flow on it, over.

SPACECRAFT Okay, understand. Do you think it's going to heat up a little bit with our activity and so forth anyway?

CAPCOM That's affirmative. It will if you wanted to speed up the process a little bit you could do what I said Jack.

SPACECRAFT Okay. Steve, I can read you the CG numbers if you like.

CAPCOM Roger, we're ready to copy. Gordo, go ahead.

SPACECRAFT Okay, it's a the reading was at 20 20, power light

on, chamber temp set on number 7, 22.8, 22.6, 22.5, 22.6, 22.9, 23.8, and the lamp status was off, no temp 1 air record fault.

CAPCOM Alright, we copy, thank you Gordo.

SPACECRAFT And we're looking at Saturn and Mars out the front window, we have been in the tail sun attitude.

CAPCOM Sounds good.

SPACECRAFT (garble)

CAPCOM Columbia Houston, say again, 2 minutes left in this pass.

SPACECRAFT Jim (garble)

CAPCOM Columbia Houston, we are 30 seconds LOS. Pick you up next at Orroral in 2 minutes.

SPACECRAFT See you in 2

PAO This is Mission Control Houston. 21 hours 39 minutes mission elapsed time. Passing out of range of the Yarragadee tracking station in western Australia and it will be a 2 minute gap here between that and the Orroral tracking station. 21 hours 39 minutes mission elapsed time. This is Mission Control Houston.

CAPCOM Columbia Houston. Back with you through Orroral for 5 minutes, over. Columbia Houston through Orroral for 4 and 1/2 minutes, over.

SPACECRAFT Okay, we're with you, Steve, go ahead.

CAPCOM As you fly by, Jack, we would like you to turn the RMS heaters to auto please and when you do give us a mark.

SPACECRAFT Okay, (garble) heaters starter standby 1.

CAPCOM Roger and give us a mark when you do that Jack, please.

SPACECRAFT Okay.

END OF TAPE

SPACECRAFT irregular rectangle shape is about 3 inches by 6 inches and the tile ahead of it is missing and the tile ahead if it has a 1 inch triangular sliver taken out of it and then up in 1, 2, 3, 4, 5, 6, 7, 8th row or the 1st row of white tile behind the black ones between the thruster and the window, there's a square tile missing. It appears to be about 3/16 in depth and about 6 inches square and Gordo's got some more insight too.

SPACECRAFT Okay. There's probably a couple more on this side, just to the right of the upfiring, the right hand upfiring thruster is one of the tiles completely missing and then there are 3 areas of missing tile between those thrusters and my windshield here. In one case it looks like just an entire tile missing completely, and in another case a tile plus pieces of adjacent tiles are gone on the other 2 areas. Over.

CAPCOM Okay. We copy all that. Thanks for the information.

SPACECRAFT Also, the cabin is chilly right now. In fact, it started out last night warm after we configured to go to warm for sleep and I was very warm on the middeck, in fact stripped down to my underware for awhile. Then it gradually got cooler and right now we've both got our jackets on.

CAPCOM Okay. We copy that.

SPACECRAFT We still have those particles eminating from the rear end of the spacecraft and it's like a blizard of particles all being ejected upwards to the right of the vertical fin as we stand here and look at it.

CAPCOM Copy. And Columbia Houston, we've got 2 minutes left in this pass. We are not recording voice at this time and we won't be until the next Bermuda pass. Also for future planning, the IMU align this morning will be required. The numbers in the cab are good and a reminder that you should maneuver in DAP B.

SPACECRAFT Okay. Okay we understand that you're happy with our roll attitude. Is that right?

CAPCOM That's affirmative. You may have heard the teleprinter running. We are sending you up a few deltas to the entry procedures.

SPACECRAFT Okay. Once again, nice job on keeping the alarms from going off last night.

CAPCOM Well the fellows worked at it. We wish you would have slept a little better but we'll try and keep it quiet for you.

SPACECRAFT I'm sure you're thinking along the same lines STS-3 that I'm thinking we ought to work in a little tile inspection with the RMS and the vector CAD this morning.

CAPCOM Roger. We'll be working on that and get back to you. Have you gone to full cool yet this morning?

SPACECRAFT We did not because we are chilly so we left it pinned to full hot and the interchange of flow is mismatched to try to warm things up here.

CAPCOM Okay. That sounds find. And Columbia Houston, we're 15 seconds LOS. We have nothing further at this time. We'll see you next in Yarragadee in 27 minutes.

SPACECRAFT Okay.

PAO This is Mission Control Houston at 21 hours, 5 minutes mission elapsed time. Just completed the pass over Madrid and you heard both of the crew members reporting that looking out their front windows in the area of the thrusters in between the thrusters and the windows that there were some pieces of tile missing and in some cases some complete square areas of tile. Perhaps not from the way it was described, perhaps not to the full depth of the tile but as Gordon Fullerton suggested it might be a good idea to look at that with...using the RMS cameras to make a better inspection and that was responded to in an affirmative way by the CAPCOM here in Mission Control

END OF TAPE

PAO This is mission control Houston at 20 hours 48 minutes, mission elapsed time. Orbiter Columbia is on it's 15th orbit around the Earth and the crew has been up for about 45 minutes now, and is reviewing the teleprinter message sent up earlier, and they will begin having their meal shortly. The activities are being organized in the mission control to prepare for the days activities. We will, are currently planning on holding the flight control change of shift briefing for the off going crystal team at approximately 9 a.m. this morning. The briefings are going according to the earlier TV scheduled issue before the launch plus 1 hour to all those times, because of the one hour launch delay. There was a significant change to the briefing time last night in order to allow the off going flight director at that time to get away from mission control in order to

CAPCOM Bermuda for one minute, over.

SPACECRAFT Ok, for a short pass reading you loud and clear, come in Steve.

CAPCOM Got you five by, trust you had a good night's sleep.

SPACECRAFT Well, it was off and on and I think we're going to make it through the day but we hope to do better today.

CAPCOM Roger.

SPACECRAFT has a nice job on the timbers.

SPACECRAFT Yeah, that's right, we didn't get a single minute to all night long, I kept getting a little noise in my ear every time we'd hit the high point in the orbit, you might take a look at that.

CAPCOM Roger, and be advised the water dump in the cap for this morning does not need to be done, you can cancel that, over.

SPACECRAFT Ok, cancel the water.

CAPCOM Columbia Houston, we're 12 seconds LOS now. See you next at Madrid in 8 minutes.

SPACECRAFT Ok.

PAO Mission control Houston 20 hours 51 minutes, mission elapsed time. Once again, reminder on that briefing for

the off going crystal flight team and flight director Harold Drawn will be held at approximatley 9 a.m. and we will keep you advised if there is any change to that at this time. 20 hours 51 minutes mission elapsed time, this is mission control Houston.

PAO Mission control Houston at 20 hours 58 minutes, mission elapsed time. Standing by for acquisiton of signal through the Madrid station for about a 6 and half minute pass.

CAPCOM Columbia Houston through Madrid for 6 minutes, over.

SPACECRAFT Good morning Brooster, how are you this morning, glad to hear from you. Have you got anything urgent for us?

CAPCOM Well, we're just fine down here Jack, we just have a few messages, nothing unusual or nothing that will change what you're going to do.

SPACECRAFT Well, let us give you a little update then. Our sleep last night, as we mentioned was not all that it could have been, but it wasn't bad. I was on a head set and as I mentioned I noticed everytime I got near the norther latitudes over and the nose areas, my sleep was interrupted by some static in the headset which I can now remove by using by taking down the air ground or by taking down the UHF, and the only way I could get rid of it was turn my audio panel off, which I didn't want to do but I got a hunch what that is, and maybe you'd like to think about that a little. We got a little cool in the cab last night, we started out warm, and so we put our interchangef full back to where it was but it didn't cool off and then now we've started warming up again, we got a little bit of condensation in the two aft windows. On both windows they act exhibiting an oval shape of a condensation of about 5 inches by 8 inches. And more significantly we got a good look at the tile on the nose of the aircraft this morning and I'll tell you about my side and Gordon can tell you about his, but we are missing a few tiles. They appear to be the white tiles, if you look out to see the front window it looks to be about the 3rd or 4th row directly ahead there's a white tile approximately a quarter of inch in depth and there's a little irregular rectangular shape. It is about 3 inches in

end of tape

PAO And flight director Harold Drawn is reviewing all spacecraft systems with the engineers here in mission control. Astronauts remain in their sleep, scheduled sleep period and are due to be awake in about 6 hours. Commander Jack Lousma and pilot Gordon Fullerton face a full day of test Tuesday working with the remote manipulator arm and the OSS 1 payload. Fourteen hours 3 minutes mission elapsed time. This is mission control Houston.

PAO This is mission control Houston, 15 hours mission elapsed time. The Columbia is, the crew aboard Columbia continues to be in their scheduled sleep period. Earlier this evening about 2 hours ago as the vehicle had passed over the Santiago tracking station, flight controllers noticed that the crew had been up at one point about 2 hours ago to perhaps make an adjustment in the systems affecting cabin temperature. The temperature in the cabin recorded about 20 minutes ago in a recent passover Ascention island was about 81 degrees fahrenheit. There was a report toward the end of the day, last night from the engineers in the payload operations control center that during the day, the first day of the flight all of the eight instruments aboard the OSS 1 payload were successfully powered on near their scheduled times and all of those instruments currently remain operational. Scientists are watching the data being collected there. Currently in mission control the flight controllers are considering what if any minor adjustments may be made to the crew activities plan for Tuesday. At 15 hours 2 minutes, mission elapsed time, this is mission control Houston.

End of tape

SPACECRAFT It's the kind of day you ought to start out with. It was perfectly made to be not to complex so that you get used to being here and we'll be ready to go tomorrow.

CAPCOM Oh, that sounds great, we do have a few disappointed people coming in the room though the planning team's coming on and there's nothing for them plan and they don't have a much of a failure status to summarize for you on your teleprinter message.

SPACECRAFT Well I can image how disappointed they are. They might even get a little rest tonight.

CAPCOM Roger, that.

SPACECRAFT I hope we can have it that way every night.

CAPCOM Columbia, just a note of interest, Crip says he remembers seeing several particles floating around on orbit also. It looks like things that were being emitted from the spacecraft so apparently this has been seen before, and any documentation you can do on it would be appreciated.

SPACECRAFT Sally, are you still there?

CAPCOM That's affirmative, Jack, we've got 1 more minute.

SPACECRAFT Ok, most of that stuff is drifting up through our 130 position going about oh, a half a foot a second. Every once in a while there will be a burst of particles that will shoot out there at a rapid velocity but they're all going upward at a 130 direction and more toward the nose of the spacecraft carrying over the right or the left wingtip. Some of them are very large but most of them are very small, and none of them are to speak of are drifting out on the starboard side of the rudder.

CAPCOM Ok, Jack, we copy all that, and were 15 seconds to LOS, we'll talk to you in the morning. And just a reminder to get the SM checkpoint, and going over the hill your attitude looks real good.

SPACECRAFT Ok, what possibility is (garble) now that we're (garble) tail sun is just heating things up there and...

PAO Mission Control Houston, LOS through Indian Ocean station 28 minutes to Hawaii, however, Indian Ocean station was the final planned communications with Columbia for the evening as the crew goes into their sleep period, that begins in about 10 minutes, and runs to 20 hours elapsed time, which ought to give them a good 8 hours solid sleep. At 11 hours 50 minutes in the flight of Columbia on STS-3, Mission Control Houston.

PAO Mission Control Houston, 12 hours 26 minutes mission elapsed time. We've had loss of signal through the Hawaii station on orbit number 9. We reacquiring in about 19 minutes.

PAO Mission Control Houston, 12 hours 45 minutes mission elapsed time. Columbia is on its 9th orbit of the Earth, and is about to pass within range of Santiago Chile tracking station, however it's unlikely they'll be in any communication with the vehicle. The crew continues to be in their sleep period. Vehicle is in darkness now, and continues to maintain the tail to sun attitude. After this pass, it will be about another hour before we come within range of another tracking station. At 12 hours 45 minutes mission elapsed time this is Mission Control Houston.

End of tape

SPACECRAFT After I turned it off, the disabled, it was off.

CAPCOM Roger we copy that. And another piece of information is we sent you a state vector a little while ago and we've been watching it, it looks like its good for the next Northrup opportunity.

SPACECRAFT Okay thank you and on the tape recorder forward light status, right now we got the channel one on and channel two off on tape recorder one but we have power light on and a forward light on and a channel one light on and a channel two light off on tape recorder one.

CAPCOM Okay we copy that and we got 30 seconds left in this pass, Indian Ocean is our last pass of the evening and its coming up in three minutes.

SPACECRAFT I wandered if you wanted us to turn our display lights off on the OSS command panel, we got all the red lights burning and thought you might want to turn them off by going into display switch off.

CAPCOM Let us think about that.

SPACECRAFT And of course...

CAPCOM And Jack, sounds good to us, go ahead and turn those off.

SPACECRAFT Okay display switch only, but power switch on.

CAPCOM That's affirmative.

PAO This is Mission Control Houston, we have had loss of signal through Botswana. We're a minute and a half away from reacquisition through Indian Ocean station. Toward the end of revolution, orbit number 8. CAPCOM, Salley Ride, continued passing up to Fullerton and Lousma, all of the current systems status as perceived by the people here in Mission Control all fuel cells are working well and pulling the kilowatts required to keep the spaceship running. APU 3 which had some overheating problems during the launch phase maybe used for the flight control system checkout later in the flight. The developmental flight instrumentation PCM recorder is functioning alright. All consumables are above the nominal redlines for this point in the flight plan. The portable S band and VHF stations that have been moved to the White Sands missile range to support landing on the 29th of March are working and have been tracking and relaying communications to Columbia throughout the day. So they're all green, we should have acquisition now through Indian Ocean site.

CAPCOM Columbia Houston, back with you through Indian

Ocean for 7 minutes.

SPACECRAFT Sally, we're fiddling with the speaker mike and tone volume, it looks like this bypass tone volume down M O 42 needs to be total clockwise, max power to be a good waker upper.

CAPCOM Ok, we copy that. And Columbia can you tell us whether you intend to sleep with the UHF on or off.

SPACECRAFT We are recommended that the UHF, I think we will sleep with it on, and Gordon's going to sleep down the hall with the speaker working although he's not going to be able to transmit over it, he will have his wireless there if he wants to transmit. I'll be sleeping up in the front seat with HAU and a plug in my ear, ok.

CAPCOM Ok, that sounds good to us, and just a reminder that if you do decide to turn the UHF off we'd like you to turn it off on panel 06 not from the APUs.

SPACECRAFT Turn it off on 06, ok, and by the way I wasn't feeling to good earlier in the day and I'm feeling a lot better now and if the folks are interested in all that, that's the status.

CAPCOM Hey, that sounds great, we appreciate hearing those words, and we want to compliment you guys on just a super job today. It looks like you've got everything done in the CAP and we're really pleased.

SPACECRAFT two teams today just been helping us along and I'd say this is the kind of day you ought to start out with. It was purposely made to be not to complex so we get used to being here and we'll be ready to go tomorrow.

CAPCOM Oh, that sounds great. We do have a few disappointed people coming into the room though the plan

End of tape

PAO will be usable on entry date, and the current fuel cell purge is apparently proceeding well according to the ground data. Back in 14 minutes for Botswana, the final pass of the evening. Mission Control Houston at 11 hours 18 minutes mission elapsed time.

PAO Mission Control Houston. About 7 seconds away from acquisition through Botswana voice relay station which likely will be the final pass of the evening as far as voice contact with the crew of Columbia.

CAPCOM Columbia Houston through Botswana for 5 and 1/2 minutes. Over.

SPACECRAFT Okay. We hear you at Botswana Sally.

CAPCOM Roger Jack. You're loud and clear and you have nothing for us so we can continue with the summary.

SPACECRAFT Okay. We were trying to set up our speaker box here so that we could use them during the night for alerts and so forth rather than plugging with the ear but I'm not sure whether I can get there.

CAPCOM Okay. We understand. First of all, your fuel cell purge looked good and just for information all the fuel cells look like they are running real well.

SPACECRAFT Boy that sure is good news isn't it.

CAPCOM And APU Number 3, you were asking about that, again we think that there is nothing wrong with it. It just froze up. We think we'll be able to use it for entry. We are talking about possibly checking it out using it for the FCS checkout and maybe running it a little bit longer than normal but we will get back to you later on in the flight on that after we make up our minds for sure.

SPACECRAFT Okay. That's also very good news.

CAPCOM And some more good news is that the DFI PCM recorder that we were a little bit worried about earlier on looks like it's running fine. We think there may be a small instrumentation problem with it but looks like the tape's running and the recorder's working. We'll be watching that tomorrow closely.

SPACECRAFT Okay. And you'll be giving us a consumables update in the morning or at least telling us how we're doing.

CAPCOM Yes we will and quickly the consumables look good. The cryo is above nominal and at last report the prop STS-

consumables were also running above nominal.

SPACECRAFT Okay, and I've noticed that every time we come out of the sunrise that we see lots of (garble) snowflakes going away from us. Some are very bright and they seem to have a propulsive force out and away from the left hand side of the nose of the spacecraft, so if your're in the spacecraft looking out they're going toward 11 o'clock from the nose.

CAPCOM Okay, we copy that and of course any pictures that you can get of those; we'd be grateful.

SPACECRAFT The particles have differing velocities and we're just wondering if this has been seen before or if we have some kind of other debris that's still breaking away or if it's got to do with the (garble) or what.

CAPCOM Okay. We'll talk about that down here. Also as far as the PDP goes, the PDP temperatures look okay to us and if you wrote it down, we'd like to get the actual MET of disable.

SPACECRAFT Yeah, we wrote that down. It was 11:06:25.

CAPCOM Okay. We've got that. Thank you. Another piece of good news for you. All day long we were getting good data out of the new White Sands sites, both the UHF and the S-band seem to be working good and they'll support us all the way through orbit tomorrow.

SPACECRAFT That's great. I understand that's Tula, right? Tula Peak?

CAPCOM That's affirmative. They are new sites that are near where Tula Peak was. And one more thing on the PDP, I forgot to ask for the forward light status.

SPACECRAFT That I described to you before? Oh, real big, they looked like a satellite almost but not very bright others are small, about the size of a, oh, look like the size of an eraser on a pencil and looks like just a light snow flurry is what it looks like.

CAPCOM Okay. We copy that and as far as the PDP goes, we got the actual MET of disable. We'd also like the forward light status.

SPACECRAFT It was off, after I turned it off, disabled there was off.

CAPCOM Roger. We copy that and another piece of information is we sent you a state vector a little while ago and we've been watching it. It looks like it's good for the next

(garble)

END OF TAPE

CAPCOM Okay. We've got that answer for you. We would like a fuel cell auto purge.

SPACECRAFT Okay, we'll start that soon. Let's see, we have the temp monitor numbers if you're curious what the cabin temps are.

CAPCOM Roger. We'd like to hear those.

SPACECRAFT Okay I'll read it too you. Jack 1 is 71.2., Number 2, 77.3. And going on in numerical order, 74.6, 78.0, 72.5, 68.6. Jack 7 is (garble) it says orifice L auto limits. It must be opened or something and Jack 8 is 70.6 Sally.

CAPCOM (garble)

SPACECRAFT and Jack 9 is 98.6.

CAPCOM Roger Jack, copy.

SPACECRAFT (garble) the temp in full heat right now and (garble) absorber went in on time 3 into 8.

CAPCOM We copy. It sounds like your flying through the cap.

SPACECRAFT Yeah.

CAPCOM And Columbia, we're trying to send you a teleprinter message and we're not getting a teleprinter return tone. We'd like you to verify the MS audio station air-to-ground 2 is in transmit/receive.

SPACECRAFT No it isn't Sally. It's in receive only.

CAPCOM Okay Gordo. We'd like it in transmit/receive.

SPACECRAFT Now it's in TR.

CAPCOM Roger, and the teleprinter message should be onboard. It said 10 blue summary. Columbia, 40 seconds to LOS. Santiago is next in 20 minutes and you might check your DAP.

SPACECRAFT (garble)

CAPCOM We think you should be in DAP bravo at this time.

SPACECRAFT I thought we were. (garble)

CAPCOM Okay. And we'll talk to you over Chile.

PAO This is Mission Control Houston. 19 minutes away from the first pass this evening at Santiago; however, we're coming up on sleep period here in the next hour or so, an hour and 10 minutes until sleep period begins so there are about 2 more station passes before we put them to bed,...Santiago, Botswana, and Indian Ocean Station. We'll return at Santiago in 18 minutes. This is Mission Control at 10 hours 52 minutes into day 1 of STS-3, the third flight of Orbiter Columbia.

PAO This is Mission Control Houston. 25 seconds away from acquisition through Santiago (Chile) tracking station. Pass lasting some 5 minutes 56 seconds. This pass and the one following over Botswana voice relay station will likely be the last contacts of the evening by voice with the crew. Flight Director Neal Hutchinson does not want to bother them after those two passes with any more business. (garble) of acquisition now which we do.

CAPCOM Columbia Houston through Santiago for 5 and 1/2 minutes.

SPACECRAFT Okay. Hello Sally. We're in the tail sun (garble) that we'd like you to take a look at to make sure you like it.

CAPCOM Okay. We'll take a look at that and Jack it looks right on to us.

SPACECRAFT Okay. That's good news. We'll just ride her out through the night then.

CAPCOM That sounds good and just a note. We're taking a look at the RMS temperatures and they're getting a little bit low. You may get an RMS temperature alarm before you get to the port RMS heater to auto which is your last step presleep. If you do get that alarm, just go ahead and take the heaters to auto and there's no need to go into the malfunction procedure.

SPACECRAFT Okay. I'm right by it. Do you want it on auto now.

CAPCOM That's fine. Go ahead to auto now.

SPACECRAFT Okay. The port RMS heaters are auto. I wasn't sure just exactly what's wanted and needs to have (garble) data log. I'm looking at it here in right time. (garble) don't see anything although just before sunset there was a bunch of white particles flying around (garble) I don't see anything in the way of (garble) or anything like that though. Is that about what we're looking for?

CAPCOM That sounds good.

END OF TAPE

SPACECRAFT Did you folks see very much of the launch this morning, with the clouds the way they were or did we get out of sight quick?

CAPCOM Oh we got some great pictures of the launch Jack. You really looked super.

SPACECRAFT Oh that's good, looked really cloudy to us. We did get VFR on top in a hurry.

CAPCOM I bet. If you guys have a chance, the POC would like another SIA observation, like to have you to fill out another data log sometime between 10:55 and 11:20 this evening, that's just if you get a chance. And that will be during the dark pass.

SPACECRAFT Okay, Sally. After 10:55 you want a data log, understand.

CAPCOM That's affirmative and we're finished with SPEC 60 Gordo.

SPACECRAFT Okay.

CAPCOM And Columbia we're still interested in the water situation. Have you had a chance to try any more of it?

SPACECRAFT We have been mixing drinks (garble) and we've been putting quite a few of them away, they all seem to have about the same number of bubbles in them. I guess we'll bring some back, I would say, its probably about 10 to 20 percent bubbles, what do you say Gordo?

LAUSMAN I wouldn't say any more than 10 percent.

CAPCOM Okay we copy that, we're 20 seconds to LOS and Hawaii next in 32 minutes.

SPACECRAFT Okay. We had a pretty good meal Sally if your still there, steak, rice and broccolli.

CAPCOM Sounds great, you missed a bar b q down here.

PAO Mission Control Houston we have acquisition through Hawaii.

SPACECRAFT You're loud and clear.

CAPCOM You're loud and clear also, Gordo and you could do us a favor and go down to the middeck and verify that the teleprinter message containing the entry weather data did make it onboard and looks good. We'd appreciate that and consider the

teleprinter good and send you another one this pass.

SPACECRAFT Okay we did that and in fact the message looks good although I noticed you had what looks like 30,000 scattered, or 30,000 broken for KSC, does that mean 3,000 or 300?

CAPCOM Stand by.

SPACECRAFT We also wanted to know if you really wanted us to do this auto fuel cell purge and I torqued the platform at 1034 and 20. over.

CAPCOM Okay Jack we copy 10:34 and 20 and if you got the torquing angles, we would like you to read them down rather than going back to the playback that way we can start to compute the compensations and build the load to fix your IMU's.

SPACECRAFT Okay here they come, IMU 1 was +00, minus .08, minus .10, IMU minus .09, minus .07, +.04, IMU minus .06, plus .09, and minus .10. How do you read?

CAPCOM Roger Jack we copy all that, thank you.

SPACECRAFT And do we need to purge the fuel cell this time around? And while we're waiting for an answer on that, let me give you the PGU data Sally.

CAPCOM Okay go ahead, we're ready.

SPACECRAFT Okay this is where we're at, 0 days 10:17, Powerlite is on and cabin temp is 25.8, 25.7, 25.3,25.5,26.niner, 27.8. The lamp status is on, the other warning and fault lights are off. Looks good.

CAPCOM Okay we copy that also Gordo, and afirm information the weather at KSC is 30,000 broken.

SPACECRAFT Alright. And we need an answer on the fuel cell purge.

CAPCOM Okay we got that answer for you. We would like a fuel cell auto purge.

SPACECRAFT Would you like that soon, we have the temp monitor number, it says here, if your curious what the cabin temps are?

CAPCOM Roger we would like to hear those.

SPACECRAFT Okay I'll read it to you, Jack 1 is....

END OF TAPE

SPACECRAFT Copy right now, if you want to give them to me again.

CAPCOM Ok, PGU sunset is at 12 plus 15 everyday, and the PGU sunrise will be at 22 plus 15 everyday, and you'll notice that that's 4 hour and 45 minute delta from what's on the cue card and that's just a result of when they carried the thing out of the O&C building. So there's not really any correlation to the launch slip.

SPACECRAFT Ok, I'd got them all down. And I've got the loop through interchanger flow to 1290 which looks about the max it'll go.

CAPCOM Ok, that sounds good. And Columbia, with 50 seconds left in this pass, I've got the latest MET of disable if you're ready to copy.

SPACECRAFT Ok, go ahead.

CAPCOM Ok, that'll be at 11:10 tonight.

SPACECRAFT Ok, in about 1 hour, we can go to

CAPCOM You'll find it on the cap on page 4-9 and Indian Ocean's next at 10 plus 10.

SPACECRAFT You say at 11 plus 10 or 10 plus 10?

CAPCOM The latest MET of disable is 11 plus 10 and Indian Ocean is next in about 4 minutes.

SPACECRAFT Ok, thank you.

PAO Mission Control Houston here, LOS through Buckswana 3 minutes away from Indian Ocean station. CAPCOM Sally Ride passed up to the crew some advice on how best to manage the environmental control system during the overnight period for keeping the cabin warm enough as they come around to the tail to the sun attitude it is expected that the cabin temperature will drop and by setting up a mismatch in the water loops it's expected, as a matter of fact, this is a routine item in the check list. It's expected that this mismatch in the water loop should keep the cabin from getting quite as cold as otherwise. We'll be back in about 3 minutes at Indian Ocean station at 10 hours 7 minutes elapsed time, Mission Control Houston.

CAPCOM Columbia Houston through Indian Ocean for 3 and half minutes.

SPACECRAFT Ok, we hear you at Indian Ocean and it sounds like the teleprinter is working too.

CAPCOM Roger, Jack, and we'd like to reset the limit, a limit for you, an FDA limit, if you could give us SM spec 60, we'll start a DEU equivalent to lower the lower limit of the exit temperature of fuel cell one. It's running a little bit low right now, and we don't want it to trip the limit during sleep.

SPACECRAFT Ok, we'll buy that, and you got spec 60 on P-0-T, Sally.

CAPCOM And correction on that, Jack, what we're doing on that is changing the in counter on that limit up to 50.

SPACECRAFT Say it again please.

CAPCOM Roger, what we're doing on that limit is actually changing the in counter.

SPACECRAFT Ok, did you folks see very much of the launch this morning with the clouds the way they were, or did we get out of sight quick?

CAPCOM No, we got some great pictures of the launch, Jack it really looked super.

SPACECRAFT Oh, that's good, it looked a little cloudy to us.

CAPCOM You should have been down here.

SPACECRAFT Although we, we did,

End of tape

CAPCOM Go ahead.

SPACECRAFT OK, I'm looking aft right now and I came back to see if anything came out when I opened the fill and drains. Possibly something did. I see some long, they look like flat, long, white things, about a foot long, maybe 18 inches long and 4 or 5 wide with kind of irregular edges along the long side. Then about 5 or 6 of those just come floating out, sort of head on out above the tail.

CAPCOM We copy that. Did you happen to get a picture of them?

SPACECRAFT I tried one Hasselblad of it just with the regular Earth's exterior setting.

CAPCOM And Gordo, just for information, when we were looking at those manifolds we saw only a couple of psi but it was enough to do the inerting.

SPACECRAFT Okay, okay more coming out, a few little flakes of white stuff just gradually drifting away. Just barely the enough, the outboard elevons appear to be trailed but the inboards I can just see the corner of and the right inboard is up probably 10 degrees from the trail position and the left inboard is full up.

CAPCOM Okay, we copy that. Apparently Joe and Dick saw that on STS-2 also.

SPACECRAFT (garble) and you got some tire pressures coming at you too.

CAPCOM Okay, and Gordo we think your two and one half minutes is up on the recorders and I've got a couple of more notes.

SPACECRAFT Go ahead Sally.

CAPCOM Okay. When you get to the vehicle recovery and FES restart in the gravity gradient procedure and you go to look at the flash evap out temp, it will probably not be greater than 47 degrees. That's all right, we'd like you to take the flash evap controller primary A to on anyway.

SPACECRAFT Okay. Well we already initiated that procedure and had to do an out temp high in order to get the temperature high enough to let the evaporator take over. It did so and I turned off the out temp, I turned it back to normal and the evaporators is controlling to 39 degrees. Is that okay?

CAPCOM That's fine Jack.

SPACECRAFT What's the other note Sally?

CAPCOM The only other is just that a reminder that we've hit the time in the flight where we will no longer be recording voice. We'll pick it up again tomorrow morning so hold any comments that you wanted to record on the OPS recorders until tomorrow morning.

SPACECRAFT Okay. I'd like to report a stowaway also. It looks like a Florida fruit fly. He just came along for the ride. Seems to be doing very well and getting where he wants to go. Right now he's walking around the front window.

CAPCOM And Columbia with 40 seconds left in this pass until a long LOS. Just an update on the PGU times. You asked about the sunrise, sunset time. Sunrise for the MET is 22 hours and 15 minutes and sunset for the PGU is 12 hours and 15 minutes and that happens every day and that's a 4 hour and 45 minute delta from what you see on the cue card and it's related to leaving the ONC Building at a different time. We going LOS. We'll talk to you again at Botswana in 34 minutes.

PAO This is Mission Control Houston. LOS through the stateside pass, 32 minutes until reacquisition through Botswana voice relay station. Sally Ride, the CAPCOM on this shift, had several flight plan notes to pass up to the crew which she did with plenty of time left over on that fairly brief final pass of the west coast for the evening. Jack Lousma reported a stowaway that may be of some interest to the New Mexico Department of Agriculture authorities at landing, a Florida fruit fly. We'll be back in 32 minutes at Botswana. Columbia near the half way point in orbit number 7 at 9 hours 27 minutes....

END OF TAPE

CAPCOM That's affirmative, Gordo, we will want that.

SPACECRAFT Alright

CAPCOM Columbia, the CRT is yours and just for information there is no water dump required this evening. We've got about 1 minute left in this pass and Botswana's next at 826 which is about 1/2 hour away.

SPACECRAFT Okay, we'll see you in about 30 and no water dump tonight, that's good. Tell Mickey we got his CAP book out and it's working great.

CAPCOM We knew it would. And Columbia, for planning purposes we're starting to get to that time of day when our COMM coverage starts going down so we won't be able to talk to you quite as often.

SPACECRAFT Well we're going to miss you Sally.

CAPCOM Roger, Jack, and we're ready for the DFI to low sample now.

SPACECRAFT Alright, DFI PCM going to low sample.

CAPCOM Roger, thank you.

PAO This is Mission Control Houston. LOS through Mila. 27 minutes away from an extremely low elevation pass at the voice relay station at Botswana, only 2.9 degrees above the horizon. Where about 3 minutes duration may or may not be able to raise them there. Getting to the time each day when the groundtrack precesses westward as the earth rotates away from the tracking range so the contact will be contacts will be fewer and fewer as the evening wears on. At 7 hours 59 minutes into the 3rd flight of Orbiter Columbia. Mission Control Houston. Mission Control Houston. 20 seconds away now from acquisition through Botswana voice relay station. However with the low elevation angle it's unlikely that Sally Ride will be able to raise the crew. Such a short pass, a tad over 3 minutes.

CAPCOM Columbia Houston through Botswana, over.

SPACECRAFT Okay, we're hearing you through Botswana a lot clearer, we're pretty much up to the timeline. Got one thing to report on the fire and smoke suppression and detection test. The left flight deck light is 30 to 40 seconds late coming on and the light in the aft bay 3 does not work during the smoke suppression test, however, it does come on in the lamp test and Gordo wants to talk to you about the MPS vacuum inerting.

CAPCOM Okay, go ahead with the MPS.

SPACECRAFT (garble)

CAPCOM And Gordo, you're coming in real weak.

SPACECRAFT Houston, Columbia.

CAPCOM Roger, go ahead

SPACECRAFT Okay, I checked the pressure, I turned on the right instrument power and there was both tapes were off scale so per the (garble) I did not do anymore vacuum inerting. I wasn't sure whether you meant to go ahead and do it anyway or just do it that way and (garble) go ahead.

CAPCOM Standby. Gordo, we'd like you to do that anyway if you have a chance and we're going over the hill, we'll talk to you again at Hawaii in 40 minutes. Columbia Houston, we've got 1 minute left in this pass, how do you read.

PAO This is Mission Control Houston. LOS through Botswana. Next station in 44 minutes is Hawaii. Meanwhile over the last Hawaii pass earlier in this orbit the flight surgeon Dr. Jim Logan and Dr. Sam Pool who is JSC medical operations division

chief had the private medical conference with the crew. Dr. Pool reports that the crew has no major problems, medically speaking, and that the crew took the precautionary scopalomene dexadrine pills for scopedex as its known. After they got to orbit as prescribed by the flight plan, Dr. Pool reports Lousma and Fullerton are in good spirts and enjoying what they're doing.

END OF TAPE

SPACECRAFT Okay. I have to get back there just a second, Sally

CAPCOM Okay.

SPACECRAFT Okay. Give me the light you want a status on

CAPCOM Okay the forward light status of tape recorder number 1.

SPACECRAFT All four lights are out as matter of fact. Power forward at channel 1 and 2.

CAPCOM Okay we copy that. We'd like you to set tape recorder two monitor switch to open.

SPACECRAFT Monitor is at open.

CAPCOM Roger and tape recorder one monitor switch to one.

SPACECRAFT .....track one, monitor one reads C Charlie for a level.

CAPCOM Okay that was going to be my next question and that's all back on the OSS panels and I've got some caution and

warning parameters that I'd like you to either copy down or you can probably change them now. They're over on the hardware caution and warning on R13.

SPACECRAFT Saly, we might want to say again. I'm ready to copy when you come back.

CAPCOM Okay Gordo, I understand you're ready to copy.

SPACECRAFT Affirmative.

CAPCOM Okay a little back ground is that the cabin pressure is a little bit high right now and we're not expecting O2 makeup until the cabin pressure drops to 14.7 and to avoid the possibility of getting an alarm during sleep, we're going to have you reset the cabin PPO2 A and B sensors. And those are channels 34 and 44. We'd like you to set them both to 2.70 volts.

SPACECRAFT Okay. I understand. 34 and 44 you want to reset to 2.7 is that upper or lower limit.

CAPCOM That's the lower limit and we'll be sending up a TMBU to change the class 3 alarm in accordance with that.

SPACECRAFT Okay and for your information I'm working that in a second. Jack has triggered up a bunch of stereo pairs of the northern Mexico site as we whistled across.

CAPCOM Hey that's great news. And Gordo, now the last step in the ACT test. We'd like the DFI recorders wide band mission to standby and check the talkback barberpole.

SPACECRAFT Standby barberpole.

CAPCOM Roger and we're ready for you to take the OEX power off and the wide band mission power off per the CAP.

SPACECRAFT Sally, you cut off but if you hear me the OEX power and wide band mission power are off.

CAPCOM Okay we copy that.

CAPCOM Columbia, Houston. We'd like to send you a DEU equivalent to try and solve the water loop cycling alarm that we got earlier. If you could call us an SM spec 60 we could get to work on that.

SPACECRAFT Okay, Jack's getting it for you. Okay. CRT 2 Sally.

CAPCOM Copy CRT 2.

CAPCOM And Gordo, just for information, what we're doing there we saw the water pump coming up slowly so the we're just changing the filter, the number of GPC cycles.

SPACECRAFT All righty. I got those caution and working limits changed, too.

CAPCOM Roger.

CAPCOM And for your information the OSS-1 tape recorder is working good.

SPACECRAFT Okay that's good news.

SPACECRAFT Got any more word on the high voltage of the PDP?

CAPCOM Looks to us like the high voltage is working good.

CAPCOM Columbia, Houston with two minutes left. Looks to us like the target suppress mode is not being set which is good news, but we noticed when you did the OPS transition, the trackers are out of the track mode. We'd like you to put them both back into the track mode and also call up and resume spec 21.

SPACECRAFT Okay I'll do it. (garbled) they gonna need another vacuum inerting.

CAPCOM That's affirmative Gordo. We will want that.

SPACECRAFT Okay.

CAPCOM Columbia the CRT is yours and just for information, there is no water dump required this evening. We've got about one minute left in this pass and Botswana is next at 8:26 which is about half an hour away

END OF TAPE

CAPCOM We saw that too.

PAO Mission Control Houston. LOS at Guam. The last 30 seconds of which was weak conversation between CAPCOM Sally Reid and the crew. It was now setting up the free drift attitude aiming toward gravity gradient. The flight surgeon Dr. Jim Logan apparently had finished his private conversation with the crew and handed over the last 30 seconds of that pass back to the operations group here. 14 minutes away from acquistion at the west coast stations, Buckhorn, Goldstone, and so forth and we'll return at that time. Everything going well aboard Columbia now. No major systems problems. No minor systems problems to speak of. At 7 hours 29 minutes into the flight of Columbia. Mission Control Houston.

CAPCOM Columbia Houston, back with you over the states.

SPACECRAFT I think I heard you called, Sally, did you?

CAPCOM That's affirmative, stateside for 14 minutes.

SPACECRAFT Okay, we're in gravity gradient. It seems to be very stable. Roll is just about zero rates. It seems to be right around .038 positive, and yaw about minus .056, .057 so it's captured and doing very well.

CAPCOM That sounds good, Jack. Columbia Houston, just a reminder we've got the ACIP test coming up this pass and we need for you to have the OEX power on and the DFI wideband mission power on. Both of those are back on R-11.

SPACECRAFT Hey, I was waiting for you to show up and they're both on right now.

CAPCOM Okay, good. We'll get a couple of commands in and then we'll be giving you some switches to throw associated with that test later.

SPACECRAFT Okay, and (garble) and waiting to (garble) standing here in California expecting a nice tour of the southwest.

CAPCOM Columbia Houston, if you could take a little bit of time out from your sigtseeing I've got a few notes to pass up to you this pass.

SPACECRAFT Okay, how much writing will it be?

CAPCOM Shouldn't be any writing. I think we can walk you through all of them.

SPACECRAFT Okay, shoot them.

CAPCOM Okay, first one is back on the aft flight deck, we'd like you to get hydraulic circ pump power number 1 to main bravo and that's just for some power balancing.

SPACECRAFT Okay, surge pump number 1 is in the main b.

CAPCOM Okay, we copy. 2nd note that I've got, We've seen a potential problem with the DFI PCM recorder and that's only probably in high sample. It seems to be working fine in low sample. There may not even be a problem in high sample. We're seeing some intermittent bite indications with it. We'd like you to take the DFI recorder the PCM recorder to high sample now and we'll look at it through the states pass and give you a go to put it back to low sample towards the end of the pass.

SPACECRAFT Okay, can I sample (garble)

CAPCOM Okay, we see that.

SPACECRAFT And we're looking straight down on Catalina Island (garble) Long Beach Harbor, (garble), Santa Barbara, it's really some day out here in the west.

CAPCOM Wish I was out there and Columbia in association with the ACIP test we're ready for the DFI recorders wideband mission to continuous record.

SPACECRAFT Okay, that's wideband mission recorder in gray.

CAPCOM Roger, we copy, and Gordo, next on my list we've got a possible trouble indication with the OSS recorder we're seeing some problems with the downlink telemetry and for troubleshooting we'd like you to tell us what the forward light status of track 1 is?

SPACECRAFT Okay, I have to get back there, just a second, Sally

CAPCOM Okay

SPACECRAFT Okay, give me the light you want on the status on.

CAPCOM Okay, the forward light status of tape recorder number 1.

SPACECRAFT All four lights are .....

END OF TAPE

CAPCOM And we're twenty seconds from LOS, states are next in about four minutes.

SPACECRAFT Roger.

PAO Mission Control Houston we've had loss of signal through Hawaii and reaquistion through the state side tracking stations in about two and a half minutes, Columbia now about a quarter away through orbit number five, we'll return at AOS Goldstone in two minutes.

CAPCOM Columbia, Houston through the states.

SPACECRAFT Okay hear you loud and clear, how are you doing ?

CAPCOM Your loud and clear Jack, and if there is somebody on the middeck I've got, I'm sorry on the flight deck I've got a couple switches for you to throw.

SPACECRAFT Okay I'm on the flight deck go ahead.

CAPCOM Okay, these are down on panel A12 these are some switches that the PDP calls out for you to do when you get the alarm and if you throw them now I think you can avoid the alarm, they're the APU heater gas gen/fuel pump switches, all three of them to A auto.

SPACECRAFT Okay, I put the APU heater gas gen/fuel pump switches, three of them to A auto.

CAPCOM That's affirmative, and the only other note that I've got for you is that we sent up quite a bit of TMBU's since the launch, and at your convience we'd like you to do an SM check point and your cleared any time you like to do an item 48 and clear the aero log.

SPACECRAFT Okay, item 48 and check point, and have you found anything out about the high voltage to PDP?

CAPCOM That's affirmative Jack, we have we saw the pressure stabilize and will be commanding the high voltage on from the ground, so you don't have need to worry about that anymore.

SPACECRAFT Okay.

SPACECRAFT Houston, Columbia

CAPCOM Go ahead

SPACECRAFT I'm not mistaken, I'm looking out over the tail here, just came up from downstairs and I think I'm looking at our landing site, Northrup strip CAVU down there.

CAPCOM That looks just about right to us.

SPACECRAFT ...for sure I can see all of the Salt flow north of the lake.

SPACECRAFT Houston, Columbia

CAPCOM Go ahead Columbia

SPACECRAFT This happened a long time ago, back somewhere in that transition after we got into the PDP, the PFP light is sitting here staring at us. I don't remember that from the simulator, its still on, S2 and S4 and is that way it ought to be?

CAPCOM We copy that, let us look at it Gordo.

SPACECRAFT It was before your shift and when I did the first push recall the BFS went stand alone somewhere reset made us track again, then some later time that light came on somewhere in that process and it's still on.

CAPCOM Okay, we copy.

SPACECRAFT Okay, Sally we got your check point taken care of, and the item 48.

CAPCOM We see that Jack, looks good.

SPACECRAFT (garble) and we activated the gas.

CAPCOM Copy, the gas is activated and Columbia we see that you did an item 48 to GNC we'd like one to SM also please.

SPACECRAFT Okay, I'll fix you up.

SPACECRAFT what are we over right now?

CAPCOM Looks to us like your right over the Gulf Coast.

SPACECRAFT Alright, I believe I'm looking at you.

CAPCOM How do we look down here?

SPACECRAFT Great, (garble) east of town,

CAPCOM Roger

CAPCOM And you ought to be coming up on

END OF TAPE

PAO Mission Control Houston. Loss of signal through Guam. 7 minutes away from reacquisition at Hawaii for probably the final time for 2 or 3 orbits till the groundtrack drifts over Hawaii again on the descending notes. Gordon Fullerton and Jack Lousma now preparing their first meal in space. Fullerton commentd that the turkey sandwich that was in his suit pocket seemed to be somewhat dry. The sandwiches carried in the escape suit pockets are for potential delays on the pad for the crew might get hungry and for snacking on until they get out of their suits and have their regular meal using the food warmer they carry on food warmer that we're using on these orbital flight tests and until the galleys are fitted on Columbia and Challenger soon to come on line on flight 6. 5 hours 54 minutes into the flight of Columbia. Back at Hawaii in 6 minutes. Mission Control Houston. Mission Control Houston. 10 seconds away from acquisition through Hawaii.

CAPCOM Columbia Houston with you through Hawaii.

SPACECRAFT Sounds real clear, Sally, you want to copy some PTU numbers, it really looks good.

CAPCOM Go ahead with the PTU, we're ready.

SPACECRAFT Okay, I took the reading as 0550, the power light was on and the chamber temps are 25.9, 25.8, 25.5, 25.7, 26.4, and 27.6. The temp pointer lights off, the lamp test is on, and it must be daytime in the PTU and no record fault light. Did our late liftoff affect our MET at sunrise?

CAPCOM Standby. Gordo, we copied all the PTU numbers and there was daytime in the PTU and we're tracking down an answer for you now on the MET and how the sunrise affect it.

SPACECRAFT Okay, We have used the WCS and it's working as advertised as far as I can tell.

CAPCOM That is good news.

CTV loud and clear. This is CTV you are loud and clear. Houston

CAPCOM Columbia, we're approaching a short keyhole over Hawaii. We'll be back with you in 30 seconds.

SPACECRAFT Okay

CAPCOM Columbia, we're back with you for 1 miniute through Hawaii.

SPACECRAFT Okay, did you get all the numbers on the PTU?

CAPCOM That's affirmative. We got them all.

SPACECRAFT I just made up a couple apple drinks. I estimate a less than 5 percent bubbles in it, but there is some in there and I guess they're kinda coming through the gun but it doesn't seem objectionable when you drink the drink.

CAPCOM We copy that. Thanks for the update. And we're 20 seconds to LOS. States are next in about 4 minutes.

SPACECRAFT Roger

END OF TAPE

SPACECRAFT that sort of thing, I'll have a look at that page.

CAPCOM Okay, the part would appreciate that.

SPACECRAFT Okay, Sally, I can kinda give you the results of this easily. The assembly is moving, it's almost, well it's just started back from full aft now. I can just see the sunrise out on the horizon as we kinda go tail first toward it. . And as far as induced atmosphere around here there's let's see one little flake of something floating along after the tail back there, oh, a couple of flakes, maybe an inch or so long, otherwise, very clean around the spacecraft. No other particles at all.

CAPCOM Okay, we copy that Gordo, that's a good report. Could you tell us how many payload bay lights you have on?

SPACECRAFT Don't have any on. I decided to give them a rest and turn them all off here at sunrise and the payload bay is pointing toward the sun, at least they're fully bathed in sunlight.

CAPCOM Okay, that sounds like a good idea. Gordo, we're 1 minute to LOS. Guam is next in 8 minutes.

SPACECRAFT Okay, I'll see you at Guam.

PAO Mission Control Houston. LOS near Yarragadee. We're 6 and 1/2 minutes away from reacquisition through Guam. Gordon Fullerton commented that this launch was the best parabala he ever flew in his life and this was a message for the people that operate the KC135 zero-g simulating aircraft that is operated by JSC. Goes under the aprobriam of vomit comet. He was currently on his 3rd bag of cold drinking water. 8 oz bag. Meanwhile, Columbia's in an orbit measuring 130.7 nautical miles perogee by 131.0 apogee which is 3/10 of a mile out of circular which I suppose is marginally acceptable. Period of the orbit 89 minutes 28 seconds. Back in 5 minutes through Guam. This is Mission Control Houston. Mission Control Houston. Acquisition through Guam in 10 seconds.

CAPCOM Columbia Houston through Guam for 3 1/2 minutes.

SPACECRAFT Sally, got your last item.

CAPCOM Got you the same.

SPACECRAFT I see you guys have got his blue pants with the blue shirt on. He's looking pretty spiffy.

CAPCOM I'm sure he does. Columbia Houston with 2 minutes left in this pass. We were wondering who's got the galley duty and how your lunch is coming?

SPACECRAFT Oh we're going slow on the galley stuff. I tried some of my turkey sandwich, my prelunch turkey sandwich, I found a little bit dry so I want to get something out of the pantry here in a moment. I've been drinking lots of water and if it's ok with you I'll ease into the food a little bit.

CAPCOM That's fine with us and we'd appreciate a call when you are finished with lunch so we can reschedule the conference.

SPACECRAFT Okay, right now I'm taking the PGU readings, I'll have those numbers for you in a minute.

CAPCOM Okay. Columbia Houston, we've got about 30 seconds left in this pass. Hawaii is next at 6 plus 01 and for information for Jack. Looks like the pressure in the PDP has stabilized and we'll be turning the high voltage on from the ground so you needn't do anything else with that.

SPACECRAFT Okay, I'll pass that along.

CAPCOM Okay, and we'll talk to you at Hawaii.

PAO Mission Control Houston. Loss of signal through Guam. 7 minutes away from reacquisition at Hawaii for

END OF TAPE

y

CAPCOM Roger, Jack, we saw that going over the hill stateside and there's no need for you to look at the mal on that just press right ahead. We think it's alright and we'll look at it a little longer.

SPACECRAFT Okay, I think you owe me one on the PDP high voltage.

CAPCOM Roger, Jack, we need to look at that a little bit longer. We'd like you to just go ahead and take your suit off and have lunch and we'll get back to you later on that.

SPACECRAFT Okay, I noticed the pressure is now reading 50.

CAPCOM Roger. Columbia Houston with 4 minutes left through Ascension. We have nothing for you on this pass. Our intention is just to let you enjoy your meal and do a little bit of siteseeing. Just for information we sent you a state vector and it looks good and the private conference we had scheduled over Guam in about 45 minutes will delay until you are finished with lunch.

SPACECRAFT Okay Sally. Sally, I'm in the process of putting in the CO2 absorbers right now. I'm trying to fight in a floating treadmill at the moment I had a (garbled) to get to number 2 in here.

CAPCOM We understand. Columbia we're 30 seconds to LOS. Botswana is next in 5 minutes.

SPACECRAFT Okay, Sally, you can log 1 into A and 2 into B on the CO2 right now. We just had an alarm. Can you tell what it is. We're going downstairs at the moment.

CAPCOM Looks like a water loop cycle, Gordon, nothing to worry about.

SPACECRAFT Okay, thanks.

PAO This is Mission Control Houston. 5 hours 11 minutes into the 3rd flight of the spacecraft Columbia. Both Lousma and Fullerton now on the lower deck preparing a meal. Apparently Jack Lousma has been so busy activating the experiments that he has not had time to get out of his escape suit. While they are preparing their meal the private conference with a surgeon that had been scheduled for later on has been deferred. Currently the spacecraft systems appear to be in excellent condition. The alarm they heard from on the lower deck turned out to be just the water loop cycling. As reported to the flight director here nothing to worry about. 3 minutes now until reacquisition through the voice relay station at Botswana. Return at that time, however, conversation may be rather scant

in as much as the flight control team here and CAPCOM Sally Ride are going to let the crew pretty well alone while they have their first meal in space. Back in two minutes for Botswana. This is Mission Control Houston. Mission Control Houston. 10 seconds now from reacquisition through voice relay station at Botswana and we'll standby in case there is any conversation here.

CAPCOM Columbia Houston. You're Botswana for 5 minutes. How do you read?

SPACECRAFT Sally, we have you loud and clear.

CAPCOM You're the same, Gordo. Columbia Houston. We've got a couple questions on the water that you drew.

SPACECRAFT Say again the question

CAPCOM Roger, we're real interested in the quality of the water and we had a couple questions. We were wondering whether you got the water out of the chiller or whether that was ambient and we also wanted to make sure that was the bag that you carried with you onboard and whether it had been filled preflight.

SPACECRAFT I think about yes to all
you . I used the chilled water, I filled the bag that Rita had filled for us and we put it in our suit pockets prior to launch. I had drunk that entirely, I re

END OF TAPE

Flight stages or put them on tape recorders and go back and finish up on the OSS-1 activation right?

CAPCOM That's affirmative.

SPACECRAFT Okay tell all the rest of those OSS guys were going to get them out of here and finish early.

CAPCOM We copy Jack.

SPACECRAFT Looks like our amps are just a little bit high Sally and the command data system on the Spec 91. I got 2.2 it ought to be something less of 2.0 what do you want me to do with that one?

CAPCOM Stand by Jack.

SPACECRAFT Sally is there any reason I shouldn't just power up this water and fill up a drink bag tank.

CAPCOM Gordo, we think that it be a great idea.

SPACECRAFT Okay.

CAPCOM And Jack you can press ahead with the activation.

SPACECRAFT .....once in awhile I get a 1.9

CAPCOM Roger, we think it looks alright.

SPACECRAFT Okay there's a thermal canister.

CAPCOM Roger

SPACECRAFT There's the induced atmosphere

CAPCOM We see it, and Columbia we got about thirty seconds to LOS Dakar is next at five plus 01 and just for your information the teleprinter message we had the same sort of problem on the first message on STS-2, we think the teleprinter is working alright and we do not intend to re send that message.

SPACECRAFT Okay, Sally I sitting here filling up my drink bag I would guess that its got about ten percent bubbles in it but that might have been because it was in it already this is the same bag that Rita gave me pre-lunch.

CAPCOM We copy that Gordo and enjoy your lunch.

PAO This is Mission Control Houston, loss of signal through the state side run on the fourth orbit, the flight of STS-3, Commander Jack Lousma presently activating the OSS-1

payload encountered a pesky light on the recorder that would not go out but he was advised to press on with the activation of the plasma data package. Plasma diagnostic package, also to do a turn off APU fuel coolant pumps, Sally Ride currently CAPCOM on this particular shift with Neal Hutchinsons' team, the off going Flight Director Tommy Holloway is now added another color to the rainbow of Flight Director colors to join red, white, blue and bronze and silver all of the others that have gone in the past. We're about four minutes now away from reaquisiton of Columbia through the station at Dakar overlapping with Ascension Island actually, and we'll return at that time. This is Mission Control Houston about five seconds away from reaquisiton through Dakar, and Ascension Island, its reported that the consumables aboard Columbia are somewhat above the nominal quanitities remaining for this point in the flight plan, we've got almost ten minutes here of tracking or at least voice communications through Dakar and Ascension should be AOS at this time.

CAPCOM Columbia, Houston through Dakar and Ascension for nine minutes.

SPACECRAFT I hear you Sally, how do you hear me?

CAPCOM We hear you loud and clear Jack.

SPACECRAFT Okay, I'm hearing you kind of weakly, one other thing I wanted to tell you about is that the spec 90 on the pallet amps are now reading 13 as opposed to the other (garble)

CAPCOM Roger Jack, we saw that going over the hill state side and there's no need for you to look at the MAL on that, just press right ahead, we think it's alright and we'll look at it a little longer.

SPACECRAFT Okay, and I think you owe me on the PDP high voltage

END OF TAPE

Voice Control, APL 237

PAO This is Mission Control Houston, four hours twenty five minutes into the third flight of the Spaceship Columbia now beginning its fourth orbit and about thirty three seconds away from acquistion through the tracking station on Kuaunia Hawaii. Should be in the midst of meal preparation at this time after activating the OSS-1 payload pallet, we'll wait for word from the crew.

CAPCOM Columbia, Houston were AOS Hawaii for seven minutes.

SPACECRAFT Okay Houston, how are you reading at Hawaii?

CAPCOM Roger, you're loud and clear Jack.

SPACECRAFT Okay, let me tell you one thing right to begin with, its not a big deal but it something you need to work on, Gordo's got his suit off, I'm up here activating the OSS and I started the recorder at 420, 4 plus 20 and I started entering the hex commands on page 1-5, I entered the last command, I had four plus 25, however, I noticed on the last entry there where it says check the engineering data select the lights to be off, that got a number eight on it, that light is not off, and I want to know if you want me to proceed to activate the PDP in spite of that?

CAPC
Roger, we copy stand by please.

CAPCOM Columbia, Houston your go to press on with that Jack.

SPACECRAFT Okay, and let us know what you hear about that light number eight the engineering data light select being on.

CAPCOM Roger, we'll get back to you on it.

CAPCOM Columbia, Houston

SPACECRAFT Yes, go ahead Terry

CAPCOM Roger, we think the engineering data select light number eight should be off at this time, we think it just initialized that way and it looks like it go for ops now, would you confirm its off?

SPACECRAFT Yes, and going back over here I noticed that is off, OFF.

CAPCOM Roger, and be no problem with that.

CAPCOM And Columbia Houston, the STS-3 ascent team has now been named the Ivory Team and we'd like to say that we've had a great time training with you the last few months and its been a great morning, we really enjoyed it, we're going to hand you over

we have enjoyed training with you too, this is one of the best training sims we've ever had with you guys and you got us off to a super start we're thankful for it and we appreciate and we'll be looking forward to seeing you again later.

CAPCOM Roger, we'll see you tomorrow night.

SPACECRAFT (garble) on coming on

CAPCOM Columbia, Houston we've lost AOS and Neil will be with you here state side.

PAO This is Mission Control Houston LOS at Hawaii, but only about two and a half minutes until reacquisiton through the state side string of tracking stations, meanwhile the off going Flight Director Tommy Holloway is making motions toward heading toward the newscenter he's now unplugged and taken off his headset, which is a great leap forward and as has the CAPCOM Terry Hart. Won't make the two thirty advertised time of course, two minutes now away from reaquisiton through Goldstone and Buckhorn.

CAPCOM Columbia, Houston Neil and the Silver team are with you state side.

SPACECRAFT Hello there Sally, Neil and the Silver team are coming loud and clear how do we read?

CAPCOM Your loud and clear also Jack.

SPACECRAFT Okay, let me give you one to start working on then, the payload ops checklist PDP activation page 1-18, there's a tape recorder one channel two enabling us .....occur earlier than the CAP at that time, do you have a PAD time for me?

CAPCOM We'll work on that Jack.

SPACECRAFT Okay, I'm hung up on the OSS activation until you come up with that one

CAPCOM We understand and we're working on it.
SPACECRAFT Okay doke

CAPCOM And Jack while were working on that you've got a go to power off the APU fuel pump valve cool B, and also the APU controller power.

SPACECRAFT Okay, let me go over there and say those again okay?

CAPCOM Roger.

END OF TAPE

CAPCOM and be advised that you have a new state vector on board, just a small change, no consequence and your nav was good and we've uplinked TMBU's and your entry REFSMMAT's, over.

SPACECRAFT Alright, the uh, we're looking good here.

CAPCOM Columbia Houston, 30 seconds left. In the correction the TMBU's did not make it up, we do have the RCS quantities onboard, we'll pick up the TMBU's up later. We'll see you at Dakar at 1 + 54

SPACECRAFT Okay, Terry, see you later.

PAO This is Shuttle Control Houston. 1 hour 47 minutes mission elapsed time. Loss of signal now with Columbia on this stateside pass. The next station to acquire will be Dekar in a little less than 7 minutes. 1 hour 47 minutes mission elapsed time. This is Shuttle Control Houston. Shuttle Control Houston. 1 hour 53 minutes 34 seconds mission elapsed time. Standing by now for a reacquisition of Columbia through Dekar. Dekar is a UHF station and so we will process no data at Mission Control.

CAPCOM Columbia Houston, on UHF through Dekar for 3 minutes. Columbia Houston, UHF through Dekar for 2 minutes. Columbia Houston, in the blind we'll talk to you next at Yarragadee at 2 + 27 over.

PAO Shuttle Control Houston. 1 hour 56 minutes mission elapsed time. We expect no voice contact with the crew through Dekar, however, we'll standby and continue to monitor. Shuttle Control Houston. 1 hour 57 minutes mission elapsed time. Out of station range with Dekar. We expect the next contact with Columbia through Yarragadee in approximatey 29 and 1/2 minutes. This is Shuttle Control Houston. This is Shuttle Control Houston. 2 hours 27 minutes mission elapsed time. Standing by now for reacquisition of signal with Columbia through Yarragadee. Yarragadee is a UHF station so this will be voice contact only.

CAPCOM Columbia Houston through Yarragadee for 6 minutes.

SPACECRAFT Okay, reading you loud and clear through Yarragadee, Terry, we're running a little behind the timeline the Theodolite readings are what's, what was getting us behind but we're working on a target set B right now I believe, the port, or the starboard doors almost closed, we're just about finished up with these and we're going to press on with them.

CAPCOM Roger, we're with you and it sounds good. You're making fine progress.

SPACECRAFT What we really want to know is how rough, and we saw all the latches are dead even and all right on the no deflection trajectory.

CAPCOM Roger, sounds good Gordon

PAO That was Gordon Fullerton reporting

END OF TAPE

PAO orbit on orbit configuration at this time.

CAPCOM Columbia Houston on UHF through Goldstone how do you copy?

SPACECRAFT You're loud and clear through Goldstone how do we read, Terry.

CAPCOM You're loud and clear Jack, we're having a little bit of difficulty locking onto you be with you in a second with some data.

SPACECRAFT Ok, we need to stay ahead of you, take a look at spec 87, we got under surge pump control range temp number 3 column the rudder's main brake PDU is reading 306 off scale high that's rudder speedbrake PDU.

CAPCOM Roger we copy that Jack and we'll start thinking about it we should have some data here shortly.

SPACECRAFT Ok, Terry, I'm looking at mal 1.3 echo on page 1 dash 17 and that says in block 1 if it is 300 degrees with a off scale high and (garble) or fail.

CAPCOM Roger we're with you and let us think about that some more.

SPACECRAFT Okay, you're not coming through very well at all and maybe its my wireless comm.

CAPCOM Negative, Jack, I think it's just the UHF, we're maybe going over the horizon on Goldstone here. We're hoping to be able to acquire shortly through Mila and we copied your last. Columbia Houston, through Mila now, how do you copy?

SPACECRAFT Okay, I'm hearing you a little weakly I think. Gordy was hearing you a better, we're going to payload bay with the lights on and get ready to work on the doors.

CAPCOM Roger

PAO 1 hour 37 minutes mission elapsed time. That was Commander Jack Lousma talking to CAPCOM Terry Hart. No indication or no data indication yet of last

CAPCOM Columbia Houston, be advised that we think the PDU problem is a transducer shift and no more action is required at this time. We'd like you proceed with the payload bay doors.

SPACECRAFT Ok, we got the vent light up and getting ready to activate the PD

CAPCOM Roger, and we have good data now

PAO Shuttle Control Houston, 1 hour 38 minutes mission elapsed time. About 9 minutes remaining on this stateside pass. No indication yet that the latches have been opened.

SPACECRAFT garble data are Houston, we brought the OSS and all those things along we were talking about. We see American flag down there in the OSS and we got Canada written right down out on the arm.

CAPCOM Roger, we understand and we'll be trying to get some TV downlink here shortly.

PAO Shuttle Control Houston, 1 hour 40 minutes mission elapsed time. Only about 3 minutes of television remaining.

CAPCOM Columbia Houston, we have a good TV downlink at this time through camera delta.

SPACECRAFT Okay, hey Terry, we're running a little late here and we gotta take a first set of target readings so we thought we won't be able to show you the doors opening.

CAPCOM Roger, no problem at all, Gordo just proceed at your own pace there

PAO 1 hour 40 minutes mission elapsed time. That was Gordon Fullerton reporting that they will probably not be able to show the door opening on television because of time line constraints. Shuttle Control Houston, 1 hour 44 minutes mission elapsed time. About 3 minutes remaining on this state side pass.

CAPCOM Columbia Houston, you'll be go for vernier RCS operations when you get to that point.

SPACECRAFT Okay, Terry, sounds good. We got a couple of Theodolite readings under our belt working pretty good.

CAPCOM Okay real good. We have a minute and a half left here at Bermuda now and be advised that we're still looking at the APU 3 problem but we see no reason that that APU should not perform fine for entry. We suspect there was a freeze up.

SPACECRAFT Okay, for some reason I had it in my mind that that was the one we downloaded all the water from.

CAPCOM You've got that right, we did. So it's not understood entirely and be advised that you have a new state vector onboard just a small change no consequence your nav was good

END OF TAPE

D

PAO Shuttle Control Houston at one hour five and half minutes, mission elapsed time, loss of signal with Columbia through Orroral Valley Columbia will next be acquired over the states in approximately twenty four minutes. INCO reported that the last call by CAPCOM Terry Hart probably did not reach the crew, meanwhile as we have loss of signal, Columbia should shortly be maneuvered to payload bay door opening attitude, at one hour six minutes mission elapsed time this is Shuttle Control Houston.

PAO This is Shuttle Control Houston, one hour twenty minutes mission elapsed time, about ten minutes away now from reacquiring Columbia over the states, meanwhile the crew aboard Columbia should be getting started on the radiator activation and setting up the theodolite or installing the theodolite for citings. As Columbia passses over the states, Lousma and Fullerton should be coming up on the work on the payload bay doors its a slow and deliberate process both are at the back station in the aft flight deck, the left is Fullerton right is Lousma. Prior to the start of the operation, the theodolite must be installed and citings made on the hand rail targets and several starboard center line targets and record the values. Fullerton should be operating the key board and switches for the latch and door opening. The sequence goes as follows; select auto mode and start door opening, stop sequence after about thirty seconds, take theodolite citings on the starboard hand rail target and some selected port center line targets, record the values then complete door opening, while still in auto mode close doors until the starboard door is almost closed, then visually determine which center line latch will make first contact with the center line latch striker plate, record the latch number at its contact point, take theodolite citings on the starboard hand rail and selected starboard center line targets, record values

then complete the door closing. Initiate automatic door open sequence and
record the time from start until all doors open indicators or indications are
received. The raditors are then deployed with the doors open and the
radiators deployed, the crew finally takes theodolite cites, citings on the
hand rail targets and longeron targets, the values are then recorded.. We're
about seven minutes to seven and a half minutes away now from reacquiring
Columbia this is Shuttle Control Houston.

PAO This is Shuttle Control Houston, one hour twenty nine minutes
mission elapsed time, about a minute away now from reacquiring Columbia over
the state side pass at the start of the second revolution of the flight of
STS-3.. Meanwhile over the states we should have television showing the
payload bay door operations, television transmission would be approximately
six minutes forty seven seconds coming through the Mila station were about
thirty seconds away now from reaquistion at one hour thirty minutes mission
elapsed time this is Shuttle Control Houston.

PAO Shuttle Control Houston, one hour thirty minutes, mission
elapsed time we have acquisiton of signal through Buckhorn, processing data
now through Buckhorn.

CAPCOM Columbia, Houston were back with you AOS at Buckhorn, welcome
back state side.

PAO The

CAPCOM Columbia, Houston how do you copy, Columbia Houston, how do you
copy?

PAO The DPS controller reports the onboard computer configuration in
on orbit configuration at this time.

END OF TAPE

CAPCOM Columbia, Houston. Would you confirm that the strings in the PASS transferred okay.

SPACECRAFT They all look good. There just some there's no errors on it.

CAPCOM Roger. We recommend an IO reset in the backup at this time and you're go to proceed.

SPACECRAFT Okay. Let's see what happens.

SPACECRAFT Okay. Looks like it jumped back and is tracking okay now.

CAPCOM Roger. We don't think it's any impact. Gordo. Why don't you press on with the procedure.

SPACECRAFT Okay I'll do that.

PAO Shuttle Control Houston. At 55 minutes 25 seconds Mission Elapsed Time. A little under 4 minutes remaining on this Yarragadee pass. Yarragadee is a UHF station so we're receiving no ground data. Shuttle Control Houston. 57 minutes 25 seconds Mission Elapsed Time. The onboard computer system now in the process of being reloaded. Presumably Lousma and Fullerton are now getting ready to freeze dry one of the primary computers to OPS 3 the entry program to put it to sleep so they will be assured of a good computer on entry day. Following that, the balance of the computers will be transitioned from OPS 1 into OPS 2.

CAPCOM Columbia, Houston. We have one minute left at Yarragadee. We'll see you at Orroral in about three minutes.

SPACECRAFT Okay. Sounds good.

PAO Shuttle Control Houston. 59 minutes 30 seconds Mission Elapsed Time. A loss of signal now through Yarragadee. Next station to acquire will be Orroral Valley in approximately 1 and a half minutes. Shuttle Control Houston. 1 hour 1 minute Mission Elapsed Time. We're reacquired Columbia through Orroral Valley. Now processing data through Orroral Valley.

CAPCOM Columbia, Houston. We're AOS Orroral configure AOS please.

SPACECRAFT Okay. We've configured AOS. Houston 201 pro and you can watch it come in here hopefully.

CAPCOM Roger.

PAO DPS reports a good freeze dry machine onboard. DPS

reports Columbia in OPS 2.

CAPCOM Columbia, Houston. We see a good OPS 201 and we have a request on an APU switch when you have a second to listen.

SPACECRAFT Okay go ahead with that.

CAPCOM Roger. We have better instrumentation on the Alpha water spray boiler controllers and we would like you to take APU or rather water spray boiler three back to Alpha at this time so we can monitor it better.

SPACECRAFT Okay Terry. 3 is in Alpha now.

CAPCOM Thank you.

SPACECRAFT (garble)

CAPCOM Roger. We're with you for about another 1 and a half minutes.

CAPCOM Columbia, Houston. 30 seconds left here at Orroral. We'll see you stateside at 1 hour and 30 minutes.

END OF TAPE

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CAPCOM Columbia, Houston no action required on the left engine helium message.

SPACECRAFT Okay Terry we kinda expected that. (garble) How is the APU 3 cooling down?

CAPCOM Roger, we're still looking at it, stand by please

SPACECRAFT okay

CAPCOM Columbia, Houston we think that APU 3 is cooling down just fine now.

SPACECRAFT Okay.

CAPCOM Columbia, Houston we have twenty seconds left here at Madrid configure LOS and we'll see you at Indian Ocean at about TIG minus five.

SPACECRAFT Columbia

PAO This is Shuttle Control Houston, at twenty three and a half minutes mission elapsed time, we have loss of signal with Columbia now through Madrid, the next station to acquire will be Indian Ocean station in approximately twelve and a half minutes. Meanwhile we will report that the APU number 3 was secured following single engine PRESS to MECO purely as a precautionary shutdown, the consideration is that there are three good APUs onboard and this shutdown should have no mission impact. Shuttle Control Houston twenty four minutes forty two seconds mission elapsed time, we've been provided the maximum heart rates for the crew at lift off, they read as follows; for the Commander Jack Lousma 132, and for the Pilot Gordon Fullerton 92, we repeat those were the maximum heart rates at lift off.

This is Shuttle
Control Houston twenty nine minutes mission elapsed time we have the following
predictions for the OMS 2 burn from Flight Dynamics officer Ron Epps, OMS 2 is
a Holman transfer done close to apogee that will bring the perigee up to a
circular orbit the predicted OMS 2 burn results are as follows; time of
ignition forty minutes fifty seconds mission elapsed time delta v of one
hundred fifty two feet per second duration one minute thirty two seconds, OMS
2 should result in a circular orbit of one hundred and thirty nautical miles
by one hundred thirty nautical miles. We're at thirty minutes mission elapsed
time now three major events must occur in the next few hours for our Lousma
and Fullerton aboard Columbia to stay on orbit. First, the onboard computer
system must be reloaded from Ops 1 to Ops 2 this is needed to align the
inertial platforms also, one computer will be loaded with Ops 3 the entry
program and put to sleep taken off line. Second, the payload bay doors must
be opened to provide cooling through the radiators to Columbia, the flash
evaporator has a life time of several hours. Third, at least two of the three
fuel cells must be purged with hydrogen and oxygen to rid the impurities the
fuel cells can survive only so many hours without purging. And the mission
they will be purged periodically, we'll follow these three activities as they
occur. Were at thirty one minutes mission elapsed time, about five minutes
away now from reacquiring Columbia through Indian Ocean station, this is
Shuttle Control Houston.

PAO Shuttle Control Houston, thirty six minutes mission elapsed
time, now acquisiton of signal with Indian Ocean station.
We will be in acquisiton with Columbia through Indian Ocean for about seven
minutes. Now processing data through

END OF TAPE

PAO Now processing data through Indian Ocean station.

CAPCOM Columbia Houston, through Indian Ocean configure AOS, please

SPACECRAFT Ok, Dan we're going to take her AOS and we're in the burn attitude 4 minutes till TIG, how you copy?

CAPCOM You're loud and clear and we'll take a good look at you

PAO Shuttle Control Houston about 3 and 1/2 minutes away now from the second OMS burn. Given a go for the second OMS burn.

CAPCOM Houston you're looking real good at TIG -3

SPACECRAFT Okay, that's good news, thank you Dave. I just completed the vacuum inerting terminate steps.

CAPCOM Roger we copy

PAO 39 minutes 45 seconds mission elapsed time, we're about a minute away now from ignition for OMS 2. 41 minutes mission elapsed time. The prop systems engineer reports ignition 2 good engines. 2 good engines good control. We're about 2 minutes away now from loss of signal through Indian Ocean. The OMS 2 burn now underway. Shuttle Control Houston, 42 minutes 30 seconds mission elapsed time. The props systems engineer reports cutoff on time. The 2nd OMS burn completed.

CAPCOM Columbia Houston, good burn, we have 20 seconds left at Indian Ocean, configure LOS and you're go for payload bay doors.

SPACECRAFT garble

PAO This is Shuttle Control Houston at 43 minutes 25 seconds mission elapsed time. Loss of signal now with Columbia through Indian Ocean station, the next station to acquire will be Yarragadee in approximately 8 and 1/2 minutes. As we passed out of Indian Ocean station range CAPCOM Terry Hart passed along to the crew Jack Lousma and Gordan Fullerton that the OMS 2 burn looked good. The crew was given a go for the payload bay door opening. At 44 minutes mission elapsed time this is Shuttle Control Houston. Shuttle Control Houston at 47 minutes mission elapsed time. Flight dynamics reports that the 2nd OMS burn came off as scheduled. The current orbit reading 130 nautical miles by 130 nautical miles. Time of ignition was 40 minutes 50 seconds, the delta V 152 feet per second, the burn duration 1 minute 32 seconds. At 47 and 1/2 minutes mission elapsed time

This is Shuttle Control Houston. Shuttle Control Houston at 52

minutes mission elapsed time standing by now for reacquisition of signal with Columbia through Yarragadee.

CAPCOM Columbia Houston, through Yarragadee how do you copy?

SPACECRAFT Houston, PLT, how do you read?

CAPCOM Columbia Houston, you're loud and clear now Gordon

SPACECRAFT Ok, Terry, I'm just starting into number 1 and the (garble) area and when I did the 106 pvo for the recall almost have the first step there, the BFS went to stand alone.

CAPCOM Roger, we copy, we have no data now, we're about 9 minutes from Orroral, it'll be able to help you some then maybe but we'll think about it though.

SPACECRAFT Ok, want me to try an I/O reset to the BFS, see if it will come back on?

CAPCOM Standby please. Columbia, Columbia Houston, would you confirm that

END OF TAPE

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CAPCOM Columbia, Houston. Would you confirm that the strings in the PASS transferred okay.

SPACECRAFT They all look good. There just some there's no errors on it.

CAPCOM Roger. We recommend an IO reset in the backup at this time and you're go to proceed.

SPACECRAFT Okay. Let's see what happens.

SPACECRAFT Okay. Looks like it jumped back and is tracking okay now.

CAPCOM Roger. We don't think it's any impact. Gordo. Why don't you press on with the procedure.

SPACECRAFT Okay I'll do that.

PAO Shuttle Control Houston. At 55 minutes 25 seconds Mission Elapsed Time. A little under 4 minutes remaining on this Yarragadee pass. Yarragadee is a UHF station so we're receiving no ground data. Shuttle Control Houston. 57 minutes 25 seconds Mission Elapsed Time. The onboard computer system now in the

process of being reloaded. Presumably Lousma and Fullerton are now getting ready to freeze dry one of the primary computers to OPS 3 the entry program to put it to sleep so they will be assured of a good computer on entry day. Following that, the balance of the computers will be transitioned from OPS 1 into OPS 2.

CAPCOM Columbia, Houston. We have one minute left at Yarragadee. We'll see you at Orroral in about three minutes.

SPACECRAFT Okay. Sounds good.

PAO Shuttle Control Houston. 59 minutes 30 seconds Mission Elapsed Time. A loss of signal now through Yarragadee. Next station to acquire will be Orroral Valley in approximately 1 and a half minutes. Shuttle Control Houston. 1 hour 1 minute Mission Elapsed Time. We're reacquired Columbia through Orroral Valley. Now processing data through Orroral Valley.

CAPCOM Columbia, Houston. We're AOS Orroral configure AOS please.

SPACECRAFT Okay. We've configured AOS. Houston 201 pro and you can watch it come in here hopefully.

CAPCOM Roger.

PAO DPS reports a good freeze dry machine onboard. DPS

reports Columbia in OPS 2.

CAPCOM Columbia, Houston. We see a good OPS 201 and we have a request on an APU switch when you have a second to listen.

SPACECRAFT Okay go ahead with that.

CAPCOM Roger. We have better instrumentation on the Alpha water spray boiler controllers and we would like you to take APU or rather water spray boiler three back to Alpha at this time so we can monitor it better.

SPACECRAFT Okay Terry. 3 is in Alpha now.

CAPCOM Thank you.

SPACECRAFT (garble)

CAPCOM Roger. We're with you for about another 1 and a half minutes.

CAPCOM Columbia, Houston. 30 seconds left here at Orroral. We'll see you stateside at 1 hour and 30 minutes.

END OF TAPE

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PAO Shuttle Control Houston at one hour five and half minutes, mission elapsed time, loss of signal with Columbia through Orroral Valley Columbia will next be acquired over the states in approximately twenty four minutes. INCO reported that the last call by CAPCOM Terry Hart probably did not reach the crew, meanwhile as we have loss of signal, Columbia should shortly be maneuvered to payload bay door opening attitude, at one hour six minutes mission elapsed time this is Shuttle Control Houston.

PAO This is Shuttle Control Houston, one hour twenty minutes mission elapsed time, about ten minutes away now from reacquiring Columbia over the states, meanwhile the crew aboard Columbia should be getting started on the radiator activation and setting up the theodolite or installing the theodolite for citings. As Columbia passses over the states, Lousma and Fullerton should be coming up on the work on the payload bay doors its a slow and deliberate process both are at the back station in the aft flight deck, the left is Fullerton right is Lousma. Prior to the start of the operation, the theodolite must be installed and citings made on the hand rail targets and several starboard center line targets and record the values. Fullerton should be operating the key board and switches for the latch and door opening. The sequence goes as follows; select auto mode and start door opening, stop sequence after about thirty seconds, take theodolite citings on the starboard hand rail target and some selected port center line targets, record the values then complete door opening, while still in auto mode close doors until the starboard door is almost closed, then visually determine which center line latch will make first contact with the center line latch striker plate, record the latch number at its contact point, take theodolite citings on the

starboard hand rail and selected starboard center line targets, record values
then complete the door closing. Initiate automatic door open sequence and
record the time from start until all doors open indicators or indications are
received. The raditors are then deployed with the doors open and the
radiators deployed, the crew finally takes theodolite cites, citings on the
hand rail targets and longeron targets, the values are then recorded.. We're
about seven minutes to seven and a half minutes away now from reacquiring
Columbia this is Shuttle Control Houston.

PAO This is Shuttle Control Houston, one hour twenty nine minutes
mission elapsed time, about a minute away now from reacquiring Columbia over
the state side pass at the start of the second revolution of the flight of
STS-3.. Meanwhile over the states we should have television showing the
payload bay door operations, television transmission would be approximately
six minutes forty seven seconds coming through the Mila station were about
thirty seconds away now from reaquistion at one hour thirty minutes mission
elapsed time this is Shuttle Control Houston.

PAO Shuttle Control Houston, one hour thirty minutes, mission
elapsed time we have acquisiton of signal through Buckhorn, processing data
now through Buckhorn.

CAPCOM Columbia, Houston were back with you AOS at Buckhorn, welcome
back state side.

PAO The

CAPCOM Columbia, Houston how do you copy, Columbia Houston, how do you
copy?

PAO The DPS controller reports the onboard computer configuration in
on orbit configuration at this time.

END OF TAPE

CAPCOM Columbia, Houston. We concur. You're go for nominal OMS-1 APU shutdown on time.

SPACECRAFT Roger.

PAO 9 minutes 38 seconds given a go for OMS-1 and the APU shutdown on time. 9 minutes 50 seconds. Columbia now maneuvering to OMS-1 burn attitude using the two 6,000 pound thrust engines OMS-1 will be positive grade moving Columbia forward and higher on her flight path placing Columbia into a limited life time orbit. Report Columbia now at burn attitude. In burn attitude. 10 minutes 43 seconds the prop systems controller reports ignition two good engines. Columbia doing the first OMS burn now.

CAPCOM Columbia, Houston. 30 seconds left. Configure LOS the burn is looking real good going over the hill we'll see you at Madrid.

SPACECRAFT Okay. I tell you the burn is looking real good. It was on time and we'll see you at Madrid.

PAO This is Shuttle Control Houston. 12 minutes Mission Elapsed Time. Prop reports cut off on the first OMS burn. We have loss of signal now with Columbia through Bermuda. The next station to acquire will be Madrid. 12 minutes 25 seconds. We expect Madrid acquisition at about 6 and a half minutes. This is Shuttle Control Houston. 15 minutes 24 seconds Mission Elasped Time. Flight Dynamics Officer Ron Epps reports the following results for the first OMS burn. Time of ignition 10 minutes 33 seconds Mission Elapsed Time. Delta V 153 feet per second. Burn duration 1 minute 27 seconds. Resulting apogee of 130 nautical miles. Resulting perigee 46 nautical miles. At 15 minutes 58 seconds Mission Elapsed Time this is Shuttle Control Houston.

PAO This is Shuttle Control Houston 18 minutes 35 seconds Mission Elapsed Time. Standing by now for reacquisition of signal with Columbia through Madrid. We now have acquisition of signal with Madrid. Now broadcasting Madrid...

CAPCOM ...Houston. We're AOS Madrid. Configure AOS.

SPACECRAFT Okay. We're here at Madrid.

SPACECRAFT Okay Houston. We had a good burn and we're on time. We're in a 131 by 46 as you can see and we'll give you a gimbal check.

CAPCOM Roger. Sounds good and we're ready for the gimbal check.

PAO 19 minutes and 33 seconds. That was Commander Jack Lousma reporting a good OMS-1 burn. Now in the process of doing a gimbal check. 20 minutes Mission Elapsed Time. About 3 and a half...

SPACECRAFT ...secondary primaries are coming at you and want you to take a look at isolation for OMS-2.

CAPCOM Roger Columbia. We'll do that.

SPACECRAFT Looks like the DFI is going to (garbled) is good.

CAPCOM Roger we concur.

PAO Shuttle Control Houston. 20 minutes 55 seconds Mission Elapsed Time. About 2 and a half minutes remaining on this pass through Madrid.

CAPCOM Columbia, Houston. The targets look good to us. You're nav is good and the TVC is good. You're go for OMS-2.

SPACECRAFT ...go for OMS-2. We'll initiate our maneuver now.

CAPCOM Roger.

PAO The external tank doors have been closed as scheduled. That was CAPCOM Terry Hart passing along to Jack Lousma and Gordon Fullerton a go for the second OMS burn. Given a go for the second OMS burn.

END OF TAPE

Mark your negative return

SPACECRAFT Negative return

PAO Four minutes twelve seconds with that call up Lousma and Fullerton committed to space travel they can no longer turn around and return to the launch site. Four minutes twenty seconds.

SPACECRAFT (garble) APU temp

Roger, we're still looking.

PAO Four minutes twenty eight seconds, that was a report of an APU temp light, four minutes thirty three seconds Columbia now sixty nautical miles.

CAPCOM Columbia, Houston, we recommend water spray boiler number three to bravo.

PAO Four minutes forty seconds, Columbia now sixty one nautical miles altitude, one hundred seventy nautical miles downrange. Four minutes fifty five seconds, Columbia now sixty two nautical miles in altitude five minutes two seconds standing by for PRESS to MECO.

CAPCOM Columbia, Houston, stand by for PRESS to MECO

CAPCOM Mark it, your PRESS to MECO with normal throttle.

SPACECRAFT Roger, through to MECO, thank you.

PAO Five minutes twenty two seconds the PRESS to MECO called by from CAPCOM Hart, should Columbia loose about one engine press on keep flying forward, Columbia's engines have enough energy to achieve normal altitude and velocity at cut off five minutes thirty five seconds Columbia now sixty three nautical miles in altitude two hundred fifty five nautical miles downrange. Velocity now reading twelve thousand three hundred feet per second.

CAPCOM We're still watching the temps on the APU 3 they are still climbing we will keep you advised.

SPACECRAFT Okay we are so.

CAPCOM Mark, five minutes fifty five seconds, standing by for single engine TAL capability.

CAPCOM Houston, you have single engine TAL capability

SPACECRAFT Roger, single engine TAL

PAO Six minutes five seconds, that report from CAPCOM Hart, indicates if a two engine failure occurred, Lousma and Fullerton are capable of an emergency landing at ROTA Naval Air Station, Spain.

PAO Six minutes twenty seconds, Columbia now sixty three nautical miles in altitude, three hundred and forty nautical miles downrange. Velocity now reading at fourteen thousand eight hundred feet per second.

CAPCOM Roger, we copy.

PAO That was Commander Jack Lousma reporting another message on APU 3. Six minutes forty five seconds, Columbia now sixty two nautical miles in altitude, three hundred and ninty eight nautical miles downrange.

CAPCOM Columbia, Houston no action required at this time, but be advised we're thinking of shutting down APU 3 after single engine PRESS to MECO.

SPACECRAFT Okay

PAO Mark, seven minutes, Columbia pitching over now diving to decrease or increase their velocity, decrease altitude giving Columbia more favorable altitude, seven minutes ten seconds standing by now for single engine

SPACECRAFT coming up over part of our window now, boy its a real beauty.

CAPCOM Roger, sounds good Jack.

PAO Standing by now for single engine PRESS to MECO call up by CAPCOM Terry Hart. Seven minutes twenty five seconds, Columbia now sixty nautical miles in altitude, five hundred and forty five nautical miles downrange.

CAPCOM Columbia, Houston single engine PRESS to MECO

SPACECRAFT Single engine PRESS

PAO Seven minutes thirty eight seconds, that report says that Lousma and Fullerton

CAPCOM Columbia Houston, we recommend you secure APU 3, over.

SPACECRAFT Okay, shutdown APU 3

PAO That was CAPCOM Terry Hart telling the crew to shutdown APU 3, the single engine PRESS to MECO call says that

the crew can achieve normal engine cut off targets even if two engines go out. Eight minutes four seconds, Columbia now fifty nine nautical miles in altitude, six hundred and thirty nautical miles downrange. G forces building for Lousma and Fullerton coming up to 3 G's. Eight minutes eighteen seconds, Columbia three main engines slowly being throttled back now, should be throttled at sixty eight percent at six seconds before main engine cutoff. Mark eight minutes thirty seconds standing by now for main engine cutoff Columbia now sixty

SPACECRAFT (garble) MECO Houston, 75.680 right on the button and two hundred and eight five

CAPCOM Roger, sounds like a good one.

PAO Eight minutes

SPACECRAFT good attitude for standing by

PAO Eight minutes

CAPCOM Roger

PAO Eight minutes forty six seconds, confirmed shutdown, Columbia again return to space, not yet returned to orbit, standing by now for external tank sep

CAPCOM Roger sep.

PAO Confirmed external tank separation. Nine minutes two seconds, Columbia now performing an evasive maneuver moving below and beyond the external tank. Nine minutes fourteen seconds, go no go status check on Mission Control by Flight Director Tom Holloway for the first OMS burn.

SPACECRAFT Okay, Houston we're go for OMS-1 here

CAPCOM Columbia, Houston we concur your go for nominal OMS 1, APU shutdown on time.

SPACECRAFT Roger

PAO Nine

END OF TAPE

CAPCOM the water system on the pad is armed.

PAO T-50 seconds and counting. T-45. We are 14 seconds away from switching command of the countdown from the ground computers to onboard computers. The development flight instrumentation recorders are on. T-33 seconds and counting. The GOX vent arm is fully retracted and we're switching controller to countdown to the onboard computers. T-25 seconds. The sequencer on the Orbiter is now controlling the final seconds. T-20 seconds. T-15, 14, 13, 12, 10, we are go for main engine ignition, 8, 7, 6, we have main engine ignition

SPACECRAFT cleared the tower, roll it over Houston

CAPCOM Roger, Columbia, rolling

PAO Houston now controlling. Mission Control confirms all maneuvers started.

SPACECRAFT Oh, what blue skies

PAO 20 seconds, thrust looks good.

CAPCOM Roger, sounds good.

PAO 26 seconds. Roll maneuver completed. 30 seconds. 1 nautical mile in altitude, throttling engines down now to 68 percent as programmed. 38 seconds. plot board status looks good Mission Control. 42 seconds. Columbia now 3 nautical miles in altitude. 46 seconds. Coming up now on maximum aerodynamic pressure on the vehicle. 55 seconds past through max still looking good. Throttling engines back to a 100 percent giving a go at throttle up.

CAPCOM Columbia, Houston, you're go at throttle up

SPACECRAFT Roger, on throttle up to

PAO Mark 1 minute 10 seconds, Columbia now 7 nautical miles in altitude, 4 nautical miles down range, velocity now reading 2700 feet per second.

SPACECRAFT airspeed, Houston

CAPCOM Roger, 460

PAO Mark 1 minute 25 seconds. Columbia now 11 nautical miles in altitude 8 nautical miles down range.

SPACECRAFT We had a freon loop light Houston

CAPCOM Roger, we're looking.

PAO That was Jack Lousma reporting a freon loop light. 1 minute 40 seconds. Coming up on negative seats for altitude is too high for ejection seat use.

CAPCOM Columbia, Houston, negative seats

SPACECRAFT Negative seats

PAO Mark 1 minute 55 seconds. Columbia now 21 nautical miles in altitude 19 nautical miles down range.

SPACECRAFT PP50 Houston

PAO 2 minutes 2 seconds standing by for solid rocket booster separation confirmation.

SPACECRAFT Ok, there's 1 in all 3

PAO 2 minute 15 seconds confirm solid rocket boosters separation.

CAPCOM Roger, Columbia Houston, we confirm guidance converged.

PAO 2 minutes 23 seconds onboard guidance is converging as programmed. Columbia is now steering for a precise window in space for main engine cutoff. 2 minutes 30 seconds standing by for 2 engine TAL capability.

SPACECRAFT nato converged at 835 Houston

CAPCOM Roger. Columbia Houston, you have two engine TAL capability.

SPACECRAFT Roger, two engine TAL

PAO 2 minutes 45 seconds I'd call up I CAPCOM Terry Hart says that Columbia now has a two engine auto landing capability. At Rota Naval Air Station, Spain. Columbia now 42 nautical miles in altitude, 58 nautical miles downrange

SPACECRAFT Ok Houston, looks like the water boiler is working real good.

CAPCOM Roger, copy

SPACECRAFT The first part of this ride is a real barn burner.

PAO 3 minutes 10 seconds. Columbia's three main engines

SPACECRAFT we got some flakes going by the window, we got some just right after liftoff.

CAPCOM Roger, we copy Jack

PAO 3 minutes

SPACECRAFT blue out there, lots of light little flakes

CAPCOM Roger

PAO 3 minutes 30 seconds, Columbia now 51 nautical miles in altitude. Return status check in Mission Control by flight director Tom Holloway. 3 minutes 40 seconds. Lousma Fullerton given a go to continue. Mark 3 minutes 45 seconds. Columbia now 53 nautical miles in altitude 104 nautical miles downrange. Really moving out now the velocity reading now 7800 feet per second.

SPACECRAFT Houston, I saw the number 3 APU oil tap climbing up there.

CAPCOM Number 3 APU, we'll take a look at it

PAO 4 minutes 2 seconds standing by for negative return

CAPCOM Houston stand by for negative return. Mark you're negative return.

SPACECRAFT Negative return

PAO 4 minutes 12 seconds with

END OF TAPE

PAO ...has been asked to perform the APU prestart.

TC T-6 minutes

PAO T-6 minutes and counting. Prestart of the APUs is complete.

OTC Flight, OTC

PAO T-

...recorder commands please.

Roger. That's going.

LTC PLT LTC

PLT LTC, PLT has APU prestart complete I have 3 gray talkbacks.

Copy. Final 33 DFI recorder talkback ....

PAO T-5 minutes 30 seconds and counting. The development site instrumentation recorders are on. The DFI provides measurements of temperatures, pressures and physical stresses on the orbiter and the recorders store this information for playback after landing. T-5 minutes 12 seconds and counting. The orbiter flight recorders are on.

CTSS LTC CTSS ...identify ....

PAO T-5 minutes and counting. We have a go for APU start.

SPACECRAFT in work.

PAO The APUs provide hydraulic power to move the aerosurfaces and main engines for steering. T-4 minutes 42 seconds and counting. The firing circuits for the solid rocket boosters ignition and range safety destruct devices have been armed. This is done with a motor driven switch called a safe and arm device. T-4 minutes 20 seconds and counting. The main fuel valve heaters have been turned off in preparation for engine start. The main engines of the orbiter will actually be started at T-6.8 seconds and it takes 3 seconds for them to reach 90 percent thrust at which time the solid motor ignition starts culminating with ignition and liftoff at T-0. T-3 minutes 55 seconds and counting. The final helium purge of the oribters main engine has started to ensure that there's no surplus hydrogen or oxygen in the area at the time of ignition. T-3 minutes 40 seconds and counting. The elevon, speedbrake, and rudder are being moved through a preprogrammed pattern to ensure

that they are ready to be used during the flight. T-3 minutes 28 seconds and counting. The shuttle is now on internal power. However, the fuel cells are still receiving their fuels from the ground support equipment for about another minute. T-3 minutes 12 seconds and counting. The profile checks of the aerosurfaces are now complete and the engine gimbal or movement check of the main engines on the orbiter is underway to ensure that they are ready for flight control. T-3 minutes and counting. T-2 minutes 55 seconds. The liquid oxygen valve for filling the external tank is closed and pressurization has begun. After the tank is pressurized, the hold capability is limited to 3 minutes and 36 seconds. T-2 minutes 40 seconds and counting. The gasseous oxygen vent arm is being retracted. T-2 minutes 30 seconds and counting. The fuel cells ground supply of oxygen and hydrogen has been terminated and the vehicle is now using it's onboard supply. T-2 minutes 15 seconds. The main engines have been moved to start position. The astronauts have cleared the caution and warning memories in their onboard computers and verified there are no unexpected errors. T-2 minutes and counting. The astronauts are configuring the APUs the auxilliary power units for a liftoff. The liquid hydrogen dump valve has been closed and flight pressurization underway. T-1 minute 45 seconds and counting. The computers are automatically verifying the readiness of the main engines at the T-1 minute point. T-1 minute 30 seconds and counting. T-1 minute 20 seconds and counting. T-1 minute 15 seconds. The liquid hydrogen tank is at flight pressure. Coming up on the one minute point in our countdown. One minute prior to the liftoff of the third Space Shuttle mission. T-1 minute and counting. The firing system for the sound suppression water system on the pad is are.

END OF TAPE